Session 8: Integrated Inflation Targeting (IIT)

A response to the flex-IT challenges in EMEs

S 8 Outline

- S 8.1. The “pragmatic” policy response of flex-IT EMEs and the rationale for Integrated Inflation Targeting (IIT)
- S 8.2. Designing and implementing Integrated Inflation Targeting (IIT) regimes (as new macro-financial stability policy frameworks)
- S 8.3. Examples of IIT at work during three episodes
- S 8.4. Policy lessons for Integrated Inflation Targeting (IIT)

ChatGPT: Key differences between flex-IT and IIT?

- **Scope of Considerations**: Integrated inflation targeting suggests a broader, more inclusive approach that may cover a wider range of economic indicators and objectives, beyond the traditional focus on inflation and the output gap.
- **Policy Tools and Framework**: While flexible inflation targeting primarily revolves around monetary policy tools to manage inflation and stabilize the economy, integrated inflation targeting might suggest a more diverse set of tools and considerations, potentially including financial stability measures and macroprudential policies.
- **Strategic Approach**: Integrated inflation targeting may imply a more adaptive and comprehensive strategic framework, potentially incorporating elements like financial market stability and international considerations more explicitly than traditional flexible inflation targeting.

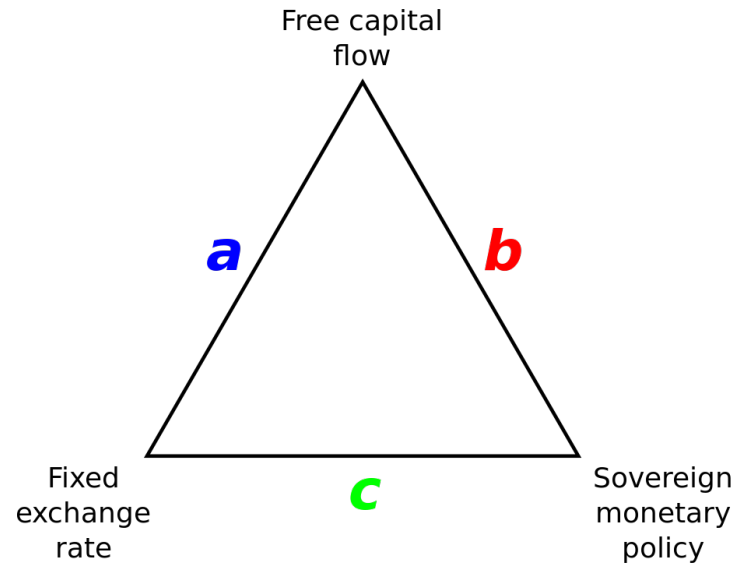
S 8.1. The “pragmatic” policy response of flex-IT EMEs and the rationale for an IIT regime

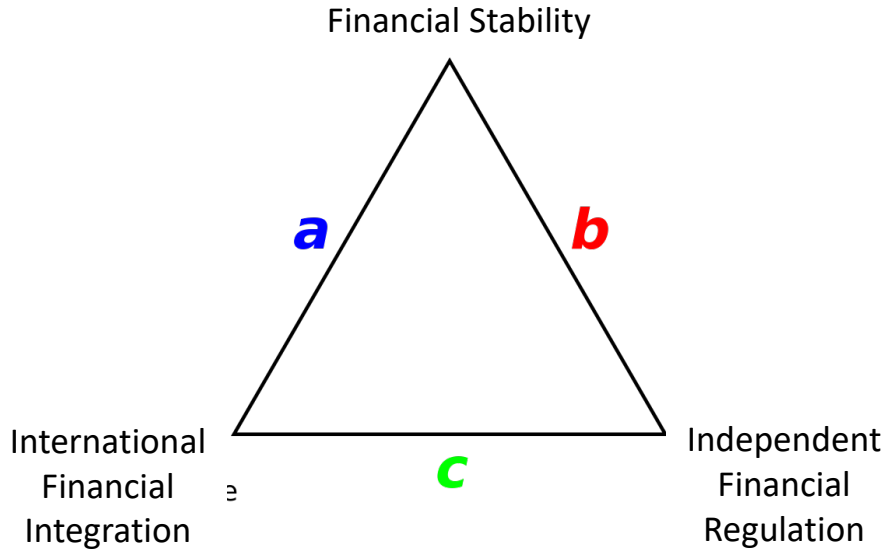
- S 8.1.1. A “de facto” shift, in many EME CBs, toward a new IIT regime combining MP, MAPs and FXI
- S 8.1.2. The underlying rationale
- S 8.1.3. Definition of Integrated Inflation Targeting regime

S 8.1.1. A “de facto” shift, in many EME CBs, toward a new IIT regime combining MP, MAPs and FXI

- As mentioned in Section 7, many EMEs using MAPs and FXI; most important, done in complement and combination to MP action
- **On FXI**: FX intervention, stabilize ER could help attaining inflation target; IT central banks concerned with ER and excessive volatility (eg., high pass-through, effect of excessive RER vol into real economy; many de facto (“managed”) floating ER regime… IT central banks conducted FX interventions to achieve simultaneously (a) greater financial integration (welcoming K flows), (b) keep monetary policy independence; and…. (c) get “some” exchange rate stability; “managing” the monetary trilemma and adapting paradigm of keeping house in order, with a flex IT and floating ER. Necessary but not sufficient? Lots of “heated” IMF-EME discussions on Art. VIII before the AREAR reporting…
- **On MAPS**: many EMEs also justified MaP interventions to flexibilize the financial trilemma; by using MAPs one could achieve: (a) domestic financial stability; while allowing (b) greater financial integration (welcoming K flows); and (c) keeping national control over financial supervision and regulation; MaPs “pragmatic” response, a way to help recipient countries insulate themselves from global financial shocks and mitigate the systemic financial risks from international capital flows

- Impossible Trinity (Monetary Trilemma Mundell, Obstfeld) only 2 of 3:
  - Open Capital Account
  - Fixed Exchange Rate
  - Independent Monetary Policy
- Financial trilemma (Obstfeld) only 2 of 3:
  - Financial stability
  - International financial integration
  - Independent/autonomous financial policy and regulation





Selected EMEs: de facto joint use of monetary, macroprudential and exchange rate policies, 2003-2020 1/

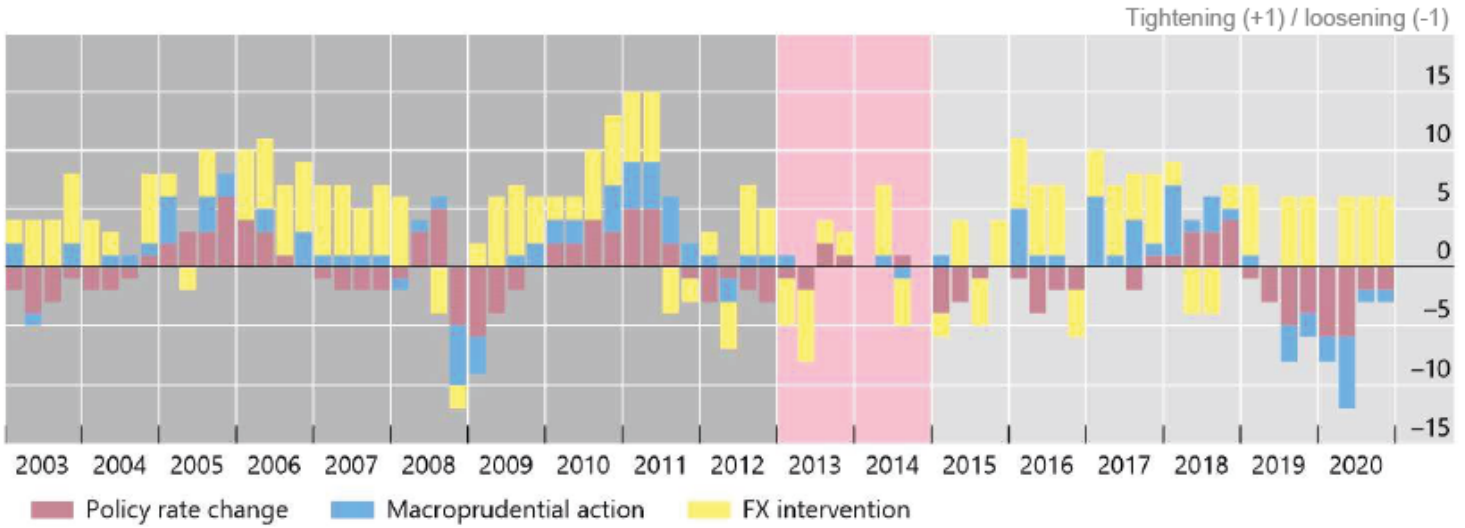
1/ Policy rate change = average quarterly change in the policy rate in percentage points across the countries divided by 50 basis points; macroprudential action = average number of the sum of tightening (+1) or loosening (-1) actions by a country across the countries; FX spot intervention = average value of the percentage change in total FX reserve assets in US dollars excluding gold across the countries normalised by its standard deviation, where a positive value means purchasing foreign currency and selling local currency and a negative value selling foreign currency and purchasing local currency.

2/ ID, IN, KR, MY, PH and TH.

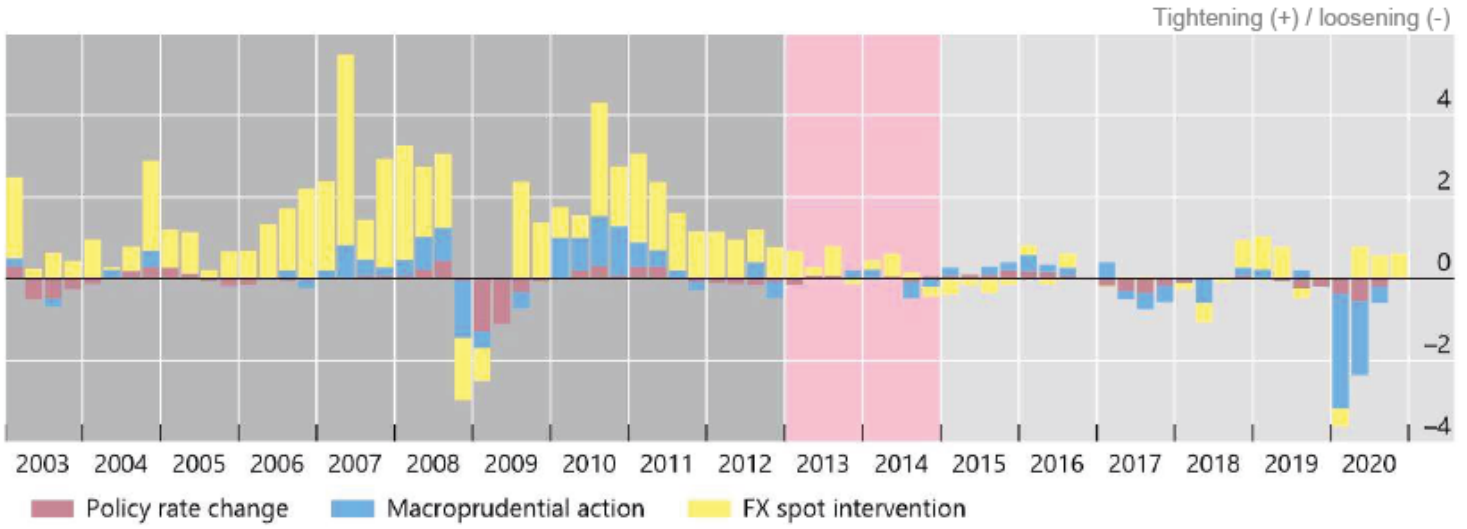
3/ BR, CL, CO, MX and PE.

Net number of MICs that tightened or loosened policy instruments — Figure 6.5a

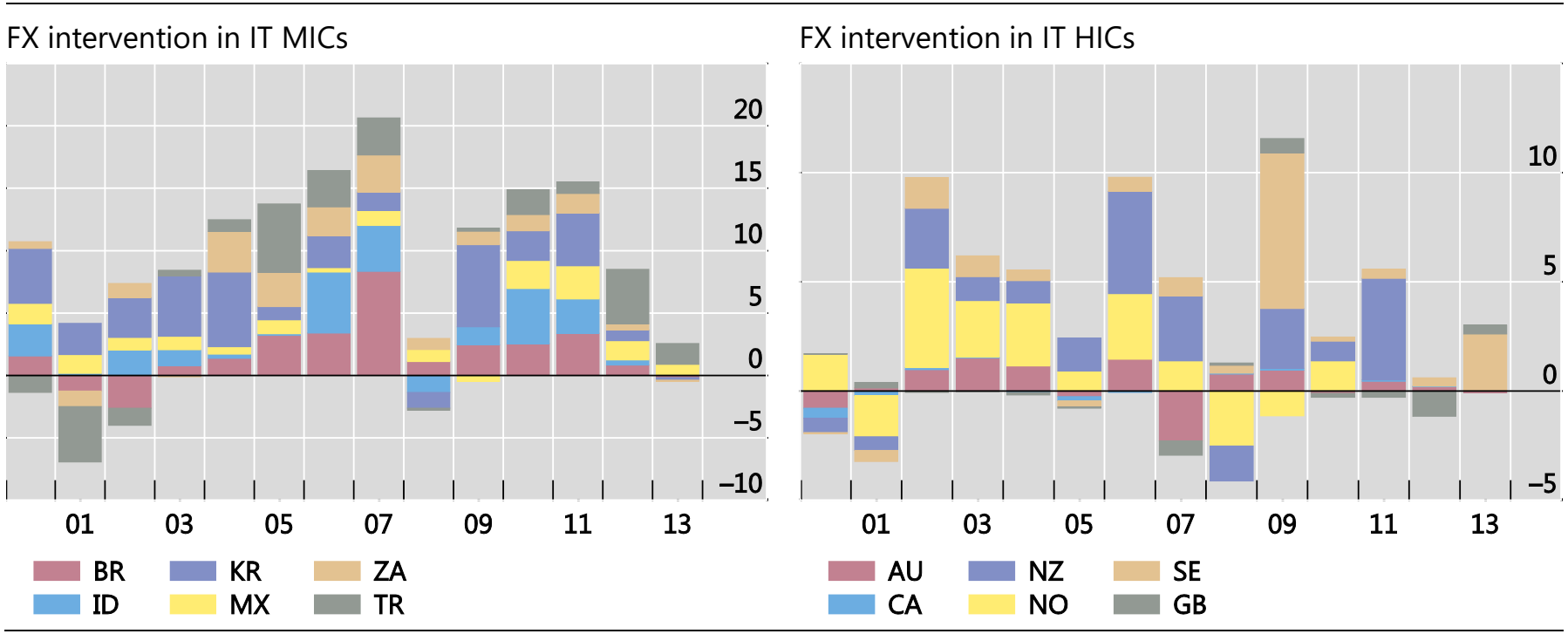
Six Asian economies[2]



Five Latin America economies[3] — Figure 6.5b



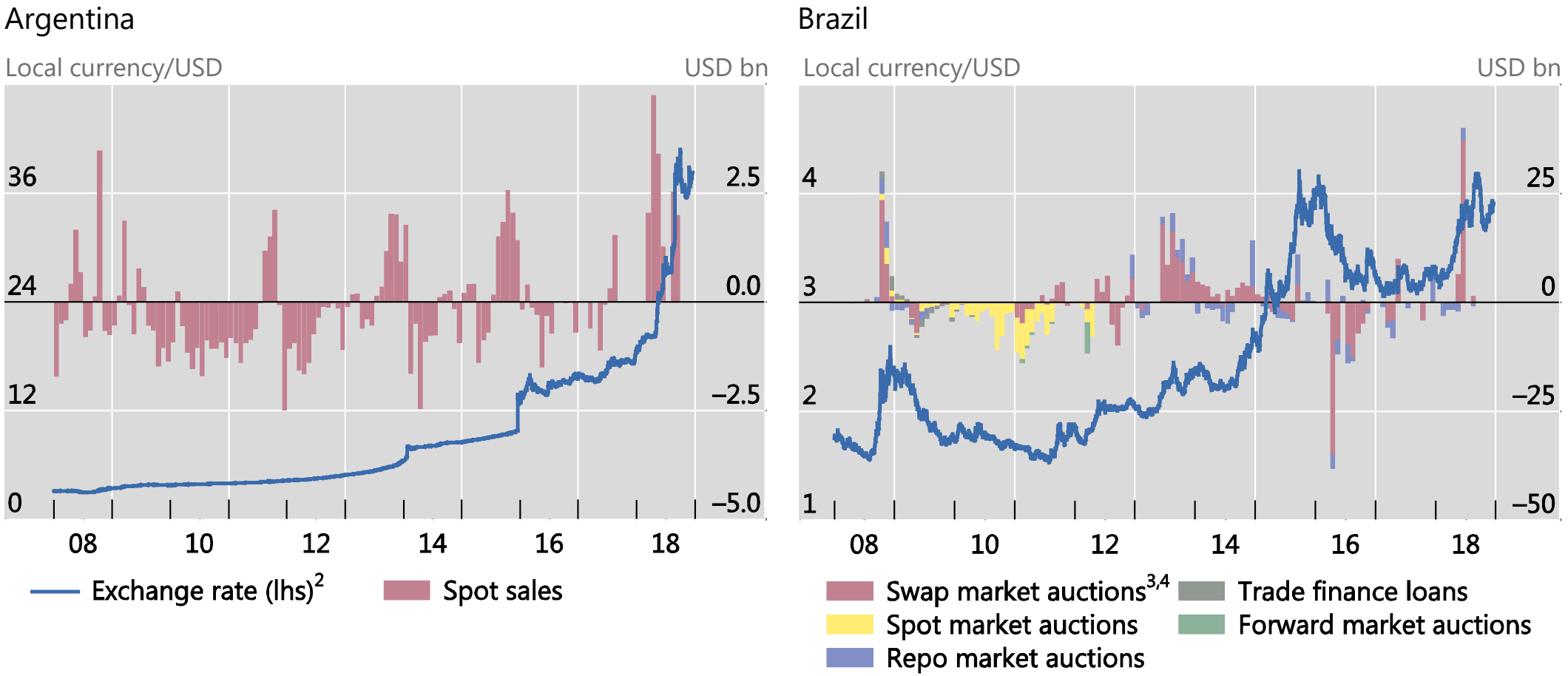
IT-EMEs and IT-AEs too intervened despite FX floating principle, see changes in NFA (% GDP)



1 For each country, **monthly changes in the central bank's net foreign assets (NFA)** are adjusted for valuation gains and normalized by annual HP trend US dollar GDP (in percentage points), aggregated at the yearly level. The change of central bank's NFA is one possible proxy for measuring FX interventions and do not capture other forms such as interventions in future markets, the usage of derivatives in local currency or communication by central banks that can affect expectations. We plot here for each year each of such occurrences as a percentage of each country's GDP.

Sources: Adler et al (2018); author's calculation.

FXI not using spot reserves; OTC derivative markets



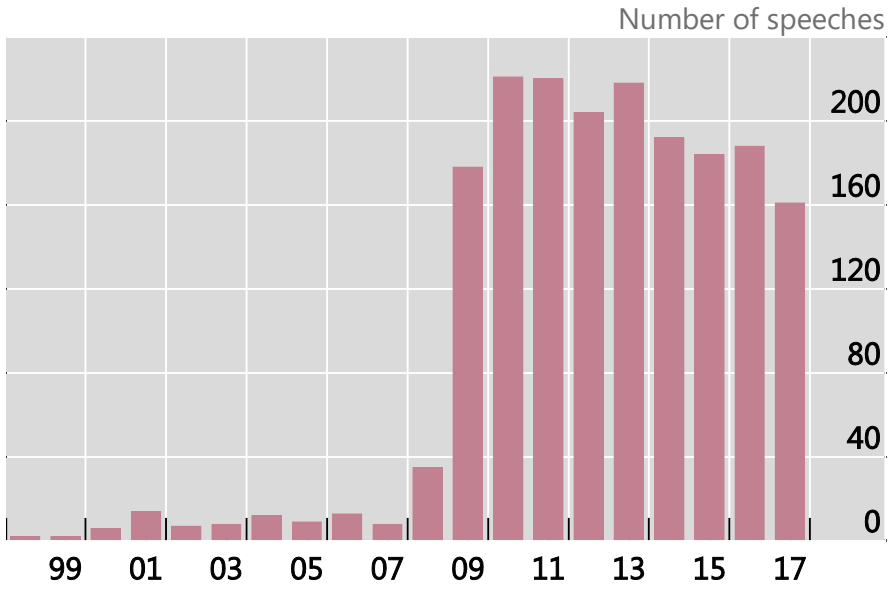
[1] The bars correspond to the sum of amounts allocated/transacted in the month. Positive values indicate a sale of US dollars by the central bank. Data for Argentina, up to 14 December 2018; Brazil, up to 7 December 2018 [2] An increase indicates depreciation of domestic currency against US dollars. [3] Purchases of FX swap contracts by central bank minus sales of FX swap contracts by central bank. When central bank buys (sells) such standard swap contracts it assumes a short (long) position in FX exposure. A currency swap is a contract for the exchange of local USD rate plus exchange rate variation (*cupom cambial*), against the interbank rate over the period of the contract. All payments are made in reais. [4] Local currency/USD indexed instruments. Transactions are indicated for illustrative purposes in terms of the expected direction of effect on the exchange rate.

Source: National data.

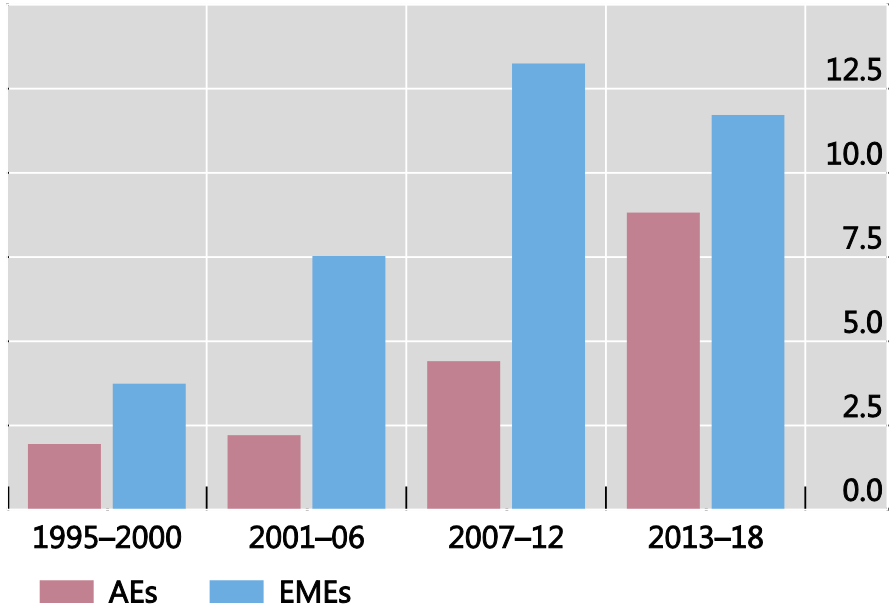
MaP mentions and MaP interventions, especially post GFC

MaP interventions have been extensively used across regions in the period 1995-2018 focusing on the resilience and the pro-cyclicality of the financial system, especially after the GFC

Central bank speeches mentioning "macroprudential"



Increasing use of macroprudential measures over time[1]

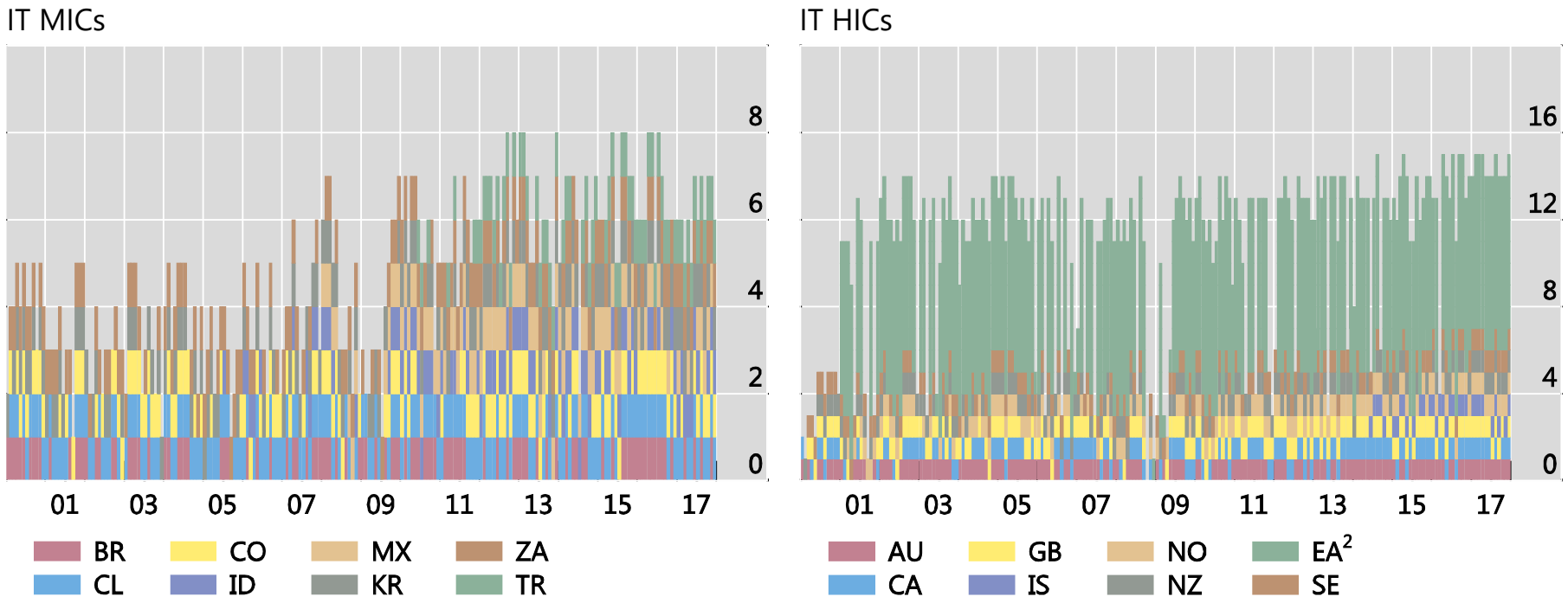


1 The bars show the average number of macroprudential measures per year and per 10 economies in each group of economies.

Sources: BIS central bankers' speeches; BIS calculations based on macroprudential measures recorded BIS 2018 Annual Report Chap 4

More IT-EMEs and IT-AEs are moving MaP and MP in the same direction as "complements" 1/

In monthly number of occurrence of complementarity

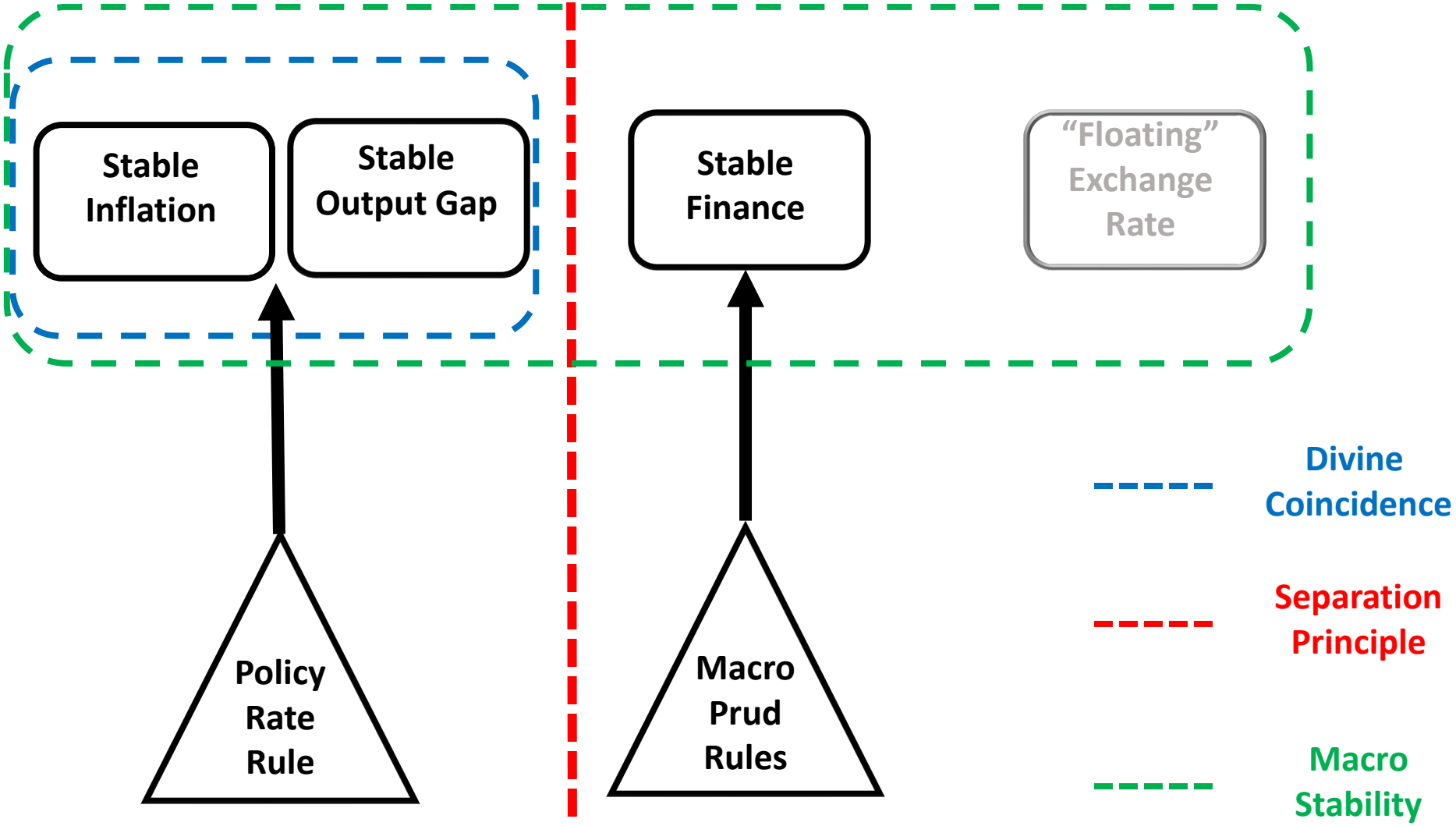


AU = Australia; BR = Brazil; CA = Canada; CL = Chile; CO = Colombia; EA = Euro area; GB = United Kingdom; ID = Indonesia; IS = Iceland; KR = South Korea; MX = Mexico; NO = Norway; NZ = New Zealand; SE = Sweden; TR = Turkey; ZA = South Africa.

[1] The country level complementarity index is equal to one if the monetary and the macroprudential policy move in the same direction in the given country, hence when both policies are tightening, loosening or staying pat in the same month and 0 otherwise. [2] EA value is an aggregate of France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain complementary indices.

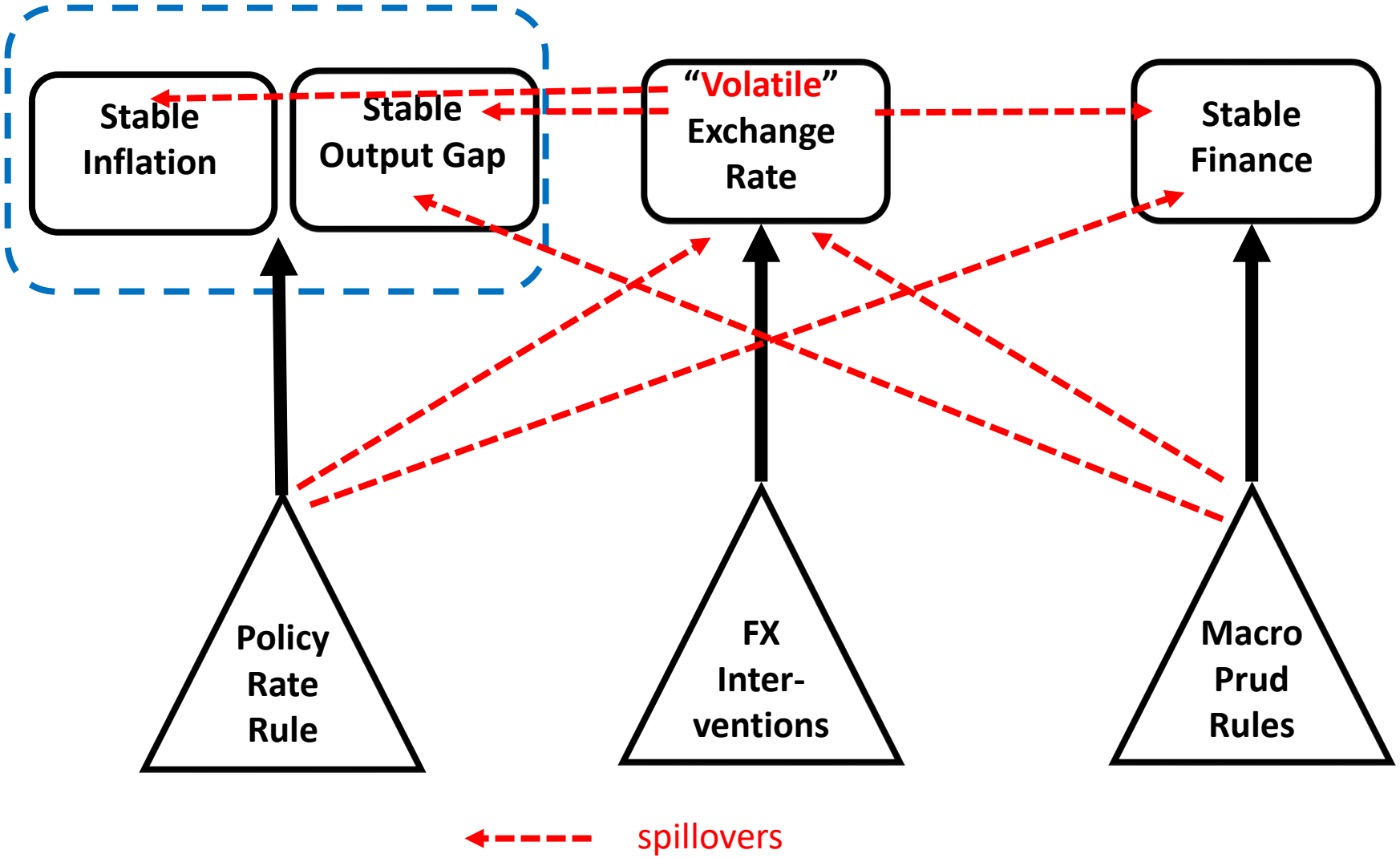
Sources: Budnik and Kleibl (2018); Reinhardt and Sowerbutts (2016); Shim et al (2012); national data; BIS Annual Economic Report (2018); Datastream; authors'calculations

S 8.1.2. The underlying rationale (moving away from the “divine coincidence”(*))



(*) “Divine coincidence” refers to the property of New Keynesian models that there is no trade-off between the stabilization of inflation and the stabilization of the welfare-relevant output gap (the gap between actual output and potential output) for CBs, property valid in the absence of real imperfections such as real wage rigidities; named after the seminal article by Olivier Blanchard and Jordi Galí in 2007

Getting into more messy world of policy spillovers of IIT



S 8.1.3. Definition of Integrated Inflation Targeting regime (1/2)

- **An IIT can be defined** as a flexible IT regime in which the central bank's mandate includes explicitly a financial stability objective:
  - Augmented policy rate reacts also to (equilibrium metric) of excessive credit
  - MP and MaP policies are calibrated jointly to achieve macroeconomic and financial stability
  - FX interventions to smooth vol, address systemic risk in financial system never to set a level for the ER; float first line of defense

S 8.1.3. Definition of Integrated Inflation Targeting regime (2/2)

- **Implementing an IIT** needs specific macroeconomic models (eg., DSGE) with financial frictions that properly account for the fact that:
  - MaP regimes may alter the monetary transmission mechanism, and
  - MP policy may affect financial stability, through excessive credit growth, interest rate spreads, and asset prices
- **Calibration of policy** through these models: optimal combination of monetary and macroprudential rules is derived from an optimisation problem, involving maximising social welfare or minimising a policy loss function, in such more complete models of the economy that needs to include a **full model of the financial sector**

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Sudden floods, macroprudential regulation and stability in an open economy☆

Pierre-Richard Agénor [a, *], Koray Alper [b], Luiz A. Pereira da Silva [c]

Integration in quantity (Loans) through calibration in Agénor et al. (2014), JIMF 48 (2014) 68-100

- CB policies

✓ Monetary policy: augmented Taylor–type rule

$$i_t = f_i[\omega_\pi(\pi_t - \pi^*), \omega_y(L_t/Y_t - L_t^*/Y_t^*), \omega_E(E_t - E^*), \dots]$$

✓ Macropru policy

$$\theta_t, \theta_t^{US} = f_\theta[(L_t - L^*), L_t^{US}] \quad \text{and} \quad \theta_t, \theta_t^{US} > 0$$

✓ FX intervention

$$NFA = f[(E_t - E^*), \varphi\Sigma L^{US}]$$

- Credit

✓ Transmission of policies

$$L_t, L_t^{US} = f_L[i_t, (i_t - i_t^{US}), \theta_t, \theta_t^{US}, E_t, Y_t]$$

- Optimisation with joint calibration of φ, ω_π, ω_y, ω_E, θ_t, θ_t^{US},

S 8.2. Designing and implementing Integrated Inflation Targeting (IIT) regimes

- S 8.2.1. The monetary transmission mechanism once again
- S 8.2.2. Integrated monetary and macroprudential policy rules
- S 8.2.3. Implementing integrated policy rules
- S 8.2.4. Other institutional arrangements under IIT
- S 8.2.5. International coordination

S 8.2.1. The monetary transmission mechanism once again (1/2)

- Intertwined objectives and instruments MP and MAPS; need to understand how they interact; especially in bank-dependent EMEs
- Several IIT papers to deal with transmission of external shocks (eg., credit booms induced by bank borrowing, ER appreciation, increase in value of collateral (housing) in SOEs, etc)
- FXI and CFM can affect banks borrowing in external capital markets
- Several tools (CCR, RR) in bank regulation can affect credit growth through “cost-channel” combined with policy rate of MP

S 8.2.1. The monetary transmission mechanism once again (2/2)

- Numerical simulations of DSGE replicate result of “sudden flood” of capital inflows induced by lower world interest rate (FED, ECB, BoJ)
- Lower risk-free global policy rate → banks borrow more externally → domestic asset prices valuation gains → collateral value increase → domestic ER appreciates (if no full sterylization, even so) → lower domestic bond rate → local credit and consumption increase
- Local counter-cyclical regulation quite effective combined with MP

Key idea in the modelling strategy: to "integrate" explicit and detailed transmission channels affecting loan rates

Loan Rate = Policy Rate + Risk Premia + Effect of Policy Instruments (MAPs)

$$i^L = i^R + \theta + \gamma\tau^L$$

- Key is how policy instruments are all represented exhaustively (KR, ER-FXI, CFM) and how they interact with risk (banks), C, I, loans (banks)
- To make explicit "cost channel" of MP with integrated interactions: need <u>explicit</u> financial sector (commercial banks) + CB + regulator + households (deposits & collateral eg. "housing") + firms (investment)
- Same principle can be used in small models (closed, SOE) or more complex DSGE; but requires some complexity to capture / calibrate accurately effect of each instrument

Asia: Use and Characteristics of CB Models

Modelling and analytics

Table 3

	Primary means for forecasting inflation and output		Primary means for assessing risks to financial stability		Regarding primary structural model:	
	Large-scale structural models (eg DSGE)	Small-scale empirical models (eg ECM, VAR)	Large-scale structural models (eg DSGE)	Small-scale empirical models (eg ECM, VAR)	Assumes uncovered interest parity (UIP)? (Y/N)	Captures FX intervention, CFM and macroprudential tools? (Y/N)
CN	√			√	N	N
HK	√			√	Y	N
ID	√			√	Y	Y
IN	√			√	Y	N
KR	√			√	Y	N
MY		√		√	Y	N
PH	√			√	Y	N
SG	√			√	Y	N
TH	√			√	Y	N

Source: BIS, ACC Working Group, "Capital Flows, Exchange Rates and Policy Frameworks in Emerging Asia" (2020).

A primer on the Lucas Critique

- In a 1976 paper, Robert Lucas argued that it is naive to try to predict the effects of a change in economic policy entirely on the basis of relationships observed in historical data, especially highly aggregated historical data. Lucas claimed that the decision rules of Keynesian models, such as the fiscal multiplier, cannot be considered as structural, in the sense that they cannot be invariant with respect to changes in government policy variables, stating:

"*Given that the structure of an econometric model consists of optimal decision-rules of economic agents, and that optimal decision-rules vary systematically with changes in the structure of series relevant to the decision maker, it follows that any change in policy will systematically alter the structure of econometric models*."

- This meant that, because the parameters of the models were not structural, i.e. not indifferent to policy, they would necessarily change whenever policy was changed. The Lucas critique is representative of the paradigm shift that occurred in macroeconomic theory in the 1970s towards attempts at establishing micro-foundations.

A primer on the Lucas Critique

- In 1982, Finn E. Kydland and Edward C. Prescott created a real business cycle (RBC) model to "predict the consequence of a particular policy rule upon the operating characteristics of the economy.“ Exogenous, stochastic "shocks to technology" involve random fluctuations in the productivity level, which shift up or down the trend of economic growth.
- Associated policy implications: no need for any form of government intervention. Microfoundations are based on the preferences of decision-makers in the model, DSGE models feature a natural benchmark for evaluating the welfare effects of policy changes. Integration of such microfoundations in DSGE modeling enables the model to accurately adjust to shifts in fundamental behaviour of agents and is thus regarded as an "response" to the Lucas critique.

A primer on DSGE

A Dynamic Stochastic General Equilibrium (DSGE) model is a type of macroeconomic model that explains aggregate economic phenomena, such as economic growth, business cycles, and the effects of monetary and fiscal policy. Key Features of DSGE Models:

- **Microeconomic Foundations**: Unlike older macroeconomic models, DSGE models are built on microeconomic foundations, eg., economic agents maximize utility or profits given their constraints, leading to a more rigorous analysis of macroeconomic policies and shocks.
- **Dynamic**: They incorporate the element of time, allowing for the analysis of how economic variables evolve over time and how current decisions affect future outcomes. This dynamic aspect is crucial for studying business cycles and the long-term impacts of policy measures.
- **Stochastic**: DSGE models include random shocks to technology, preferences, policy, and other variables to mimic real-world unpredictability. These stochastic components allow models to simulate how economies can deviate from equilibrium paths and how they adjust over time in response to these shocks.
- **General Equilibrium**: They consider the interactions between different sectors of the economy (e.g., households, firms, government) and how these interactions determine the allocation of scarce resources across different uses in a way that markets clear (supply equals demand).

Components of DSGE Models

- **Agents**: Economic actors (households, firms, government, central bank) modeled with specific objectives and constraints. Key feature for financial stability: banks
- **Markets**: Various markets where goods, services, labor, and capital are traded + loans.
- **Equations**: System of equations derived from agents' optimization problems and market clearing conditions.
- **Shocks**: Random variables that represent unexpected changes in technology, policy, preferences, or external factors.

Criticisms and Limitations

- DSGE models have faced criticism for their assumptions about rational expectations and market efficiency, the difficulty of accurately modeling shocks and frictions, and their performance in predicting economic crises. Critics argue that these models can be overly simplistic or unrealistic in representing complex economic dynamics and human behavior.
- Despite these criticisms, DSGE models continue to be developed and refined, incorporating more realistic features like heterogeneous agents, financial frictions, and non-rational expectations to better capture the complexities of real-world economies.

1. Households' Optimization

- **Utility Maximization**: Reflects how households choose consumption, labor supply, and sometimes investment in capital or savings to maximize their utility over time, subject to their budget constraint. A typical utility function might include variables for consumption and leisure/work hours.

$$\max_{\{C_t, L_t, S_t, \ldots\}} E_0 \sum_{t=0}^{\infty} \beta^t U(C_t, 1 - L_t, \ldots)$$

- where *Ct* is consumption, *Lt* is labor supplied, *St* could represent savings or investment, *β* is the discount factor, and *U* is the utility function.

2. Firms' Optimization

- **Profit Maximization**: Describes how firms choose the amount of labor and capital to employ to maximize profits, given the production technology and wages/rental rates. A production function might look like this:

$$Y_t = A_t F(K_t, L_t)$$

- where *Yt* is output, *At* represents technology level or productivity, *Kt* is the capital stock, and *Lt* is labor.

3. Market Clearing Conditions

- **Goods Market**: Equilibrium where demand equals supply (closed eco).

$$Y_t = C_t + I_t + G_t$$

- where *Ct* is consumption, *It* is investment and *Gt* is government spending.
- **Labor Market**: Determines the equilibrium wage where the demand for labor by firms equals the supply of labor by households.

4. Monetary Policy Rule

- **Interest Rate Rule**: Often a Taylor rule, which sets the nominal interest rate based on inflation, natural rate, output gap and/or inflation gap.

$$i_t = r_t^* + \pi_t + \phi_\pi(\pi_t - \pi_t^*) + \phi_y(Y_t - \bar{Y}_t)$$

- where *it* is the nominal interest rate, *πt* is inflation, (*πt -π*t)* is inflation gap, (Yt-$\underline{Y}$) the output gap.

5. Inflation Dynamics

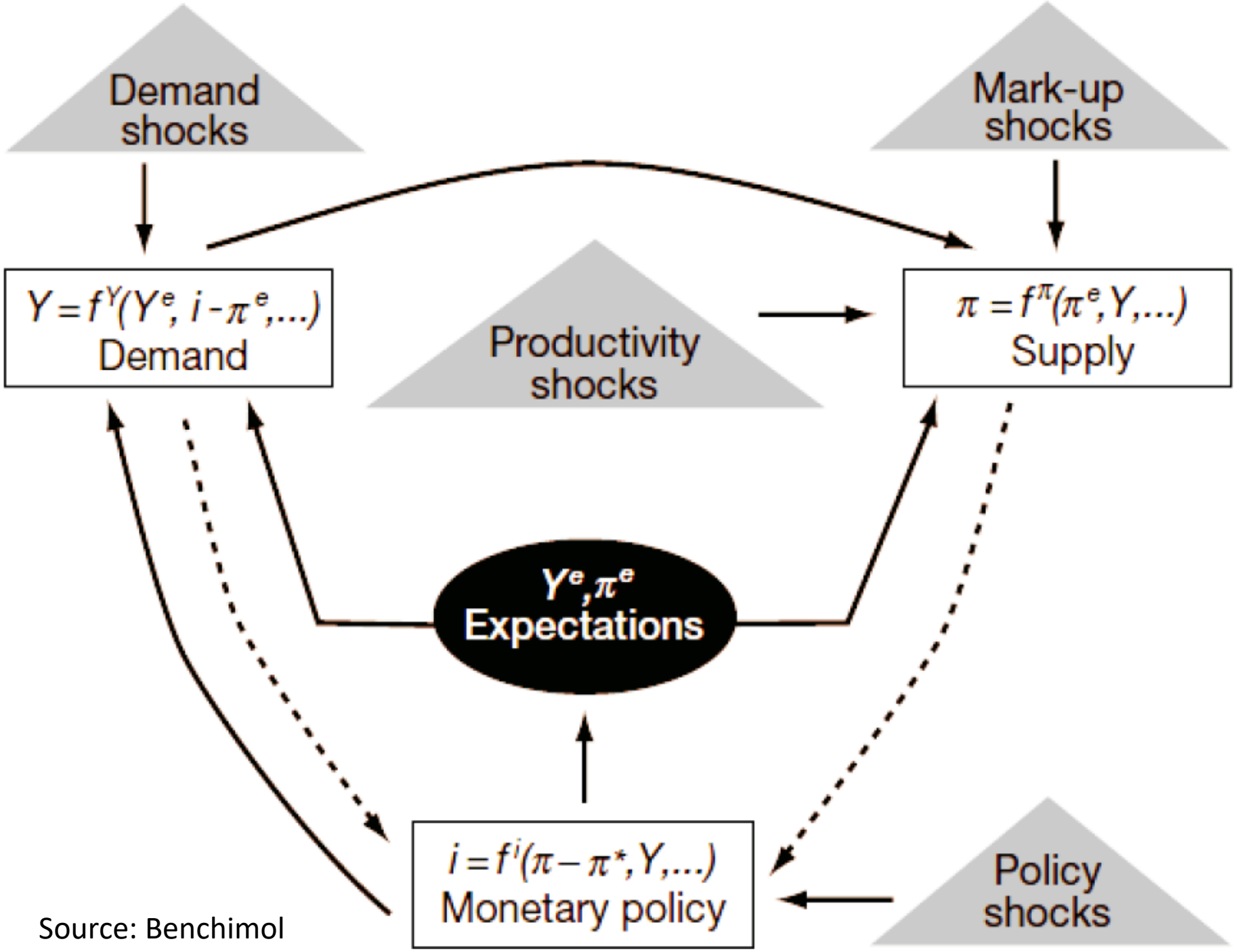
- **Phillips Curve**: A relation that might be used to describe how inflation evolves over time in response to economic conditions (output gap or unemployment gap, expectations about inflation, etc).

$$\pi_t = \beta E_t[\pi_{t+1}] + \kappa(Y_t - \bar{Y}) + \nu_t \qquad \pi_t = \pi_{e,t} - \alpha(U_t - U_n) + \nu_t$$

- where *κ* measures how inflation responds to the output gap, and *vt* represents a cost-push shock.

- Two schools of analysis form the bulk of DSGE modeling: the classic RBC models, and the New-Keynesian DSGE models that build on a structure similar to RBC models, but instead assume that prices are set by monopolistically competitive firms, and cannot be instantaneously and costlessly adjusted.

- Demand block gives real activity Y as function of ex-ante interest rate and expected Y
- Real activity impacts inflation π, in the Supply block with expected inflation
- Activity Y and inflation π, feed Monetary policy block, to give the policy setting rule
- That affect real activity Y but also forms expectations about future activity and future inflation
- Shocks are present in demand, supply, costs and policy reactions



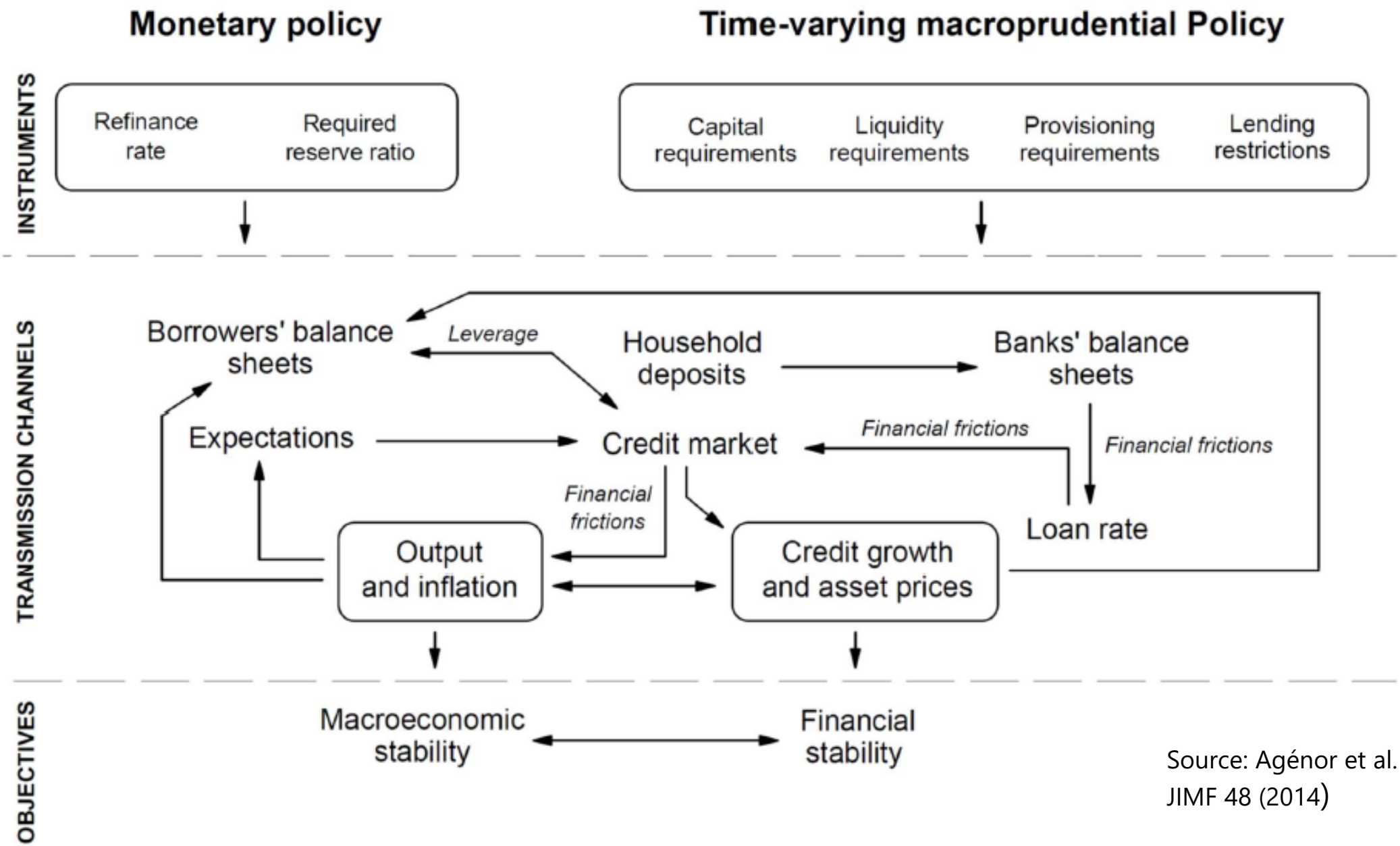
Source: Benchimol

Policy Analysis with DSGE

- With agents and markets defined, maximization behavior will provide equilibrium in all markets, a steady state solution (closed x open eco)
- Then, shocks can be analyzed:
  - Productivity
  - Fiscal policy
  - Monetary policy
- Effects of these shocks and policy responses can be evaluated using Welfare of agents or deviations from eg., an objective function of specific agent (Central Bank)

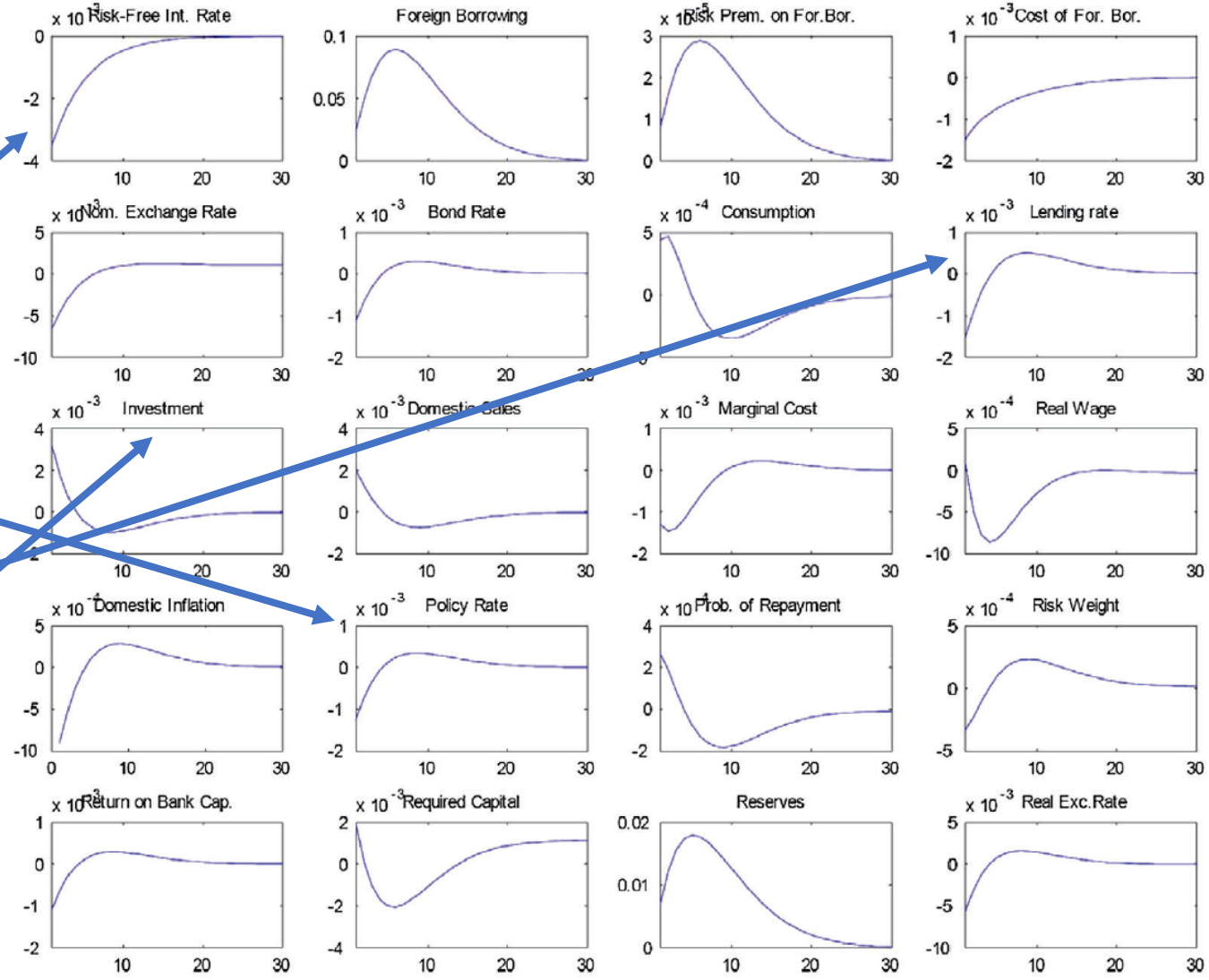
Policy Analysis with DSGE WITH BANKS

- Key for implementing an IIT regime
- Have a fully modelled financial sector in the macro-model used (eg., DSGE with bank and in an open economy set-up)
- Balance sheet effect, collateral value effect, risk premium (repayment probability effect) on the lending rate



Source: Agénor et al. (2014), JIMF 48 (2014)

- Baseline case: Drop in the World interest rate
- Effect on domestic policy rate, fall in lending rate, rise in investment, etc shows a "domestic boom"



Note: Interest rates, inflation rate and the repayment probability are measured in absolute deviations, that is, in the relevant graphs a value of 0.05 for these variables corresponds to a 5 percentage point deviation in absolute terms. RER denotes the real exchange rate, defined in terms of the prices domestic and imported intermediate goods.

Fig. 2. Base Experiment: Temporary Drop in World Risk-Free Interest Rate. (Deviations from Steady State).

- Increase in the parameter characterizing the countercyclical regulatory rule (required capital as MAP)
- The outcome of this experiment (red lines) shows that despite inducing higher volatility in bank capital, the presence of the rule mitigates the investment boom v-a-v the baseline steady state (lending rate and investment)
- Lower investment, higher lending rate

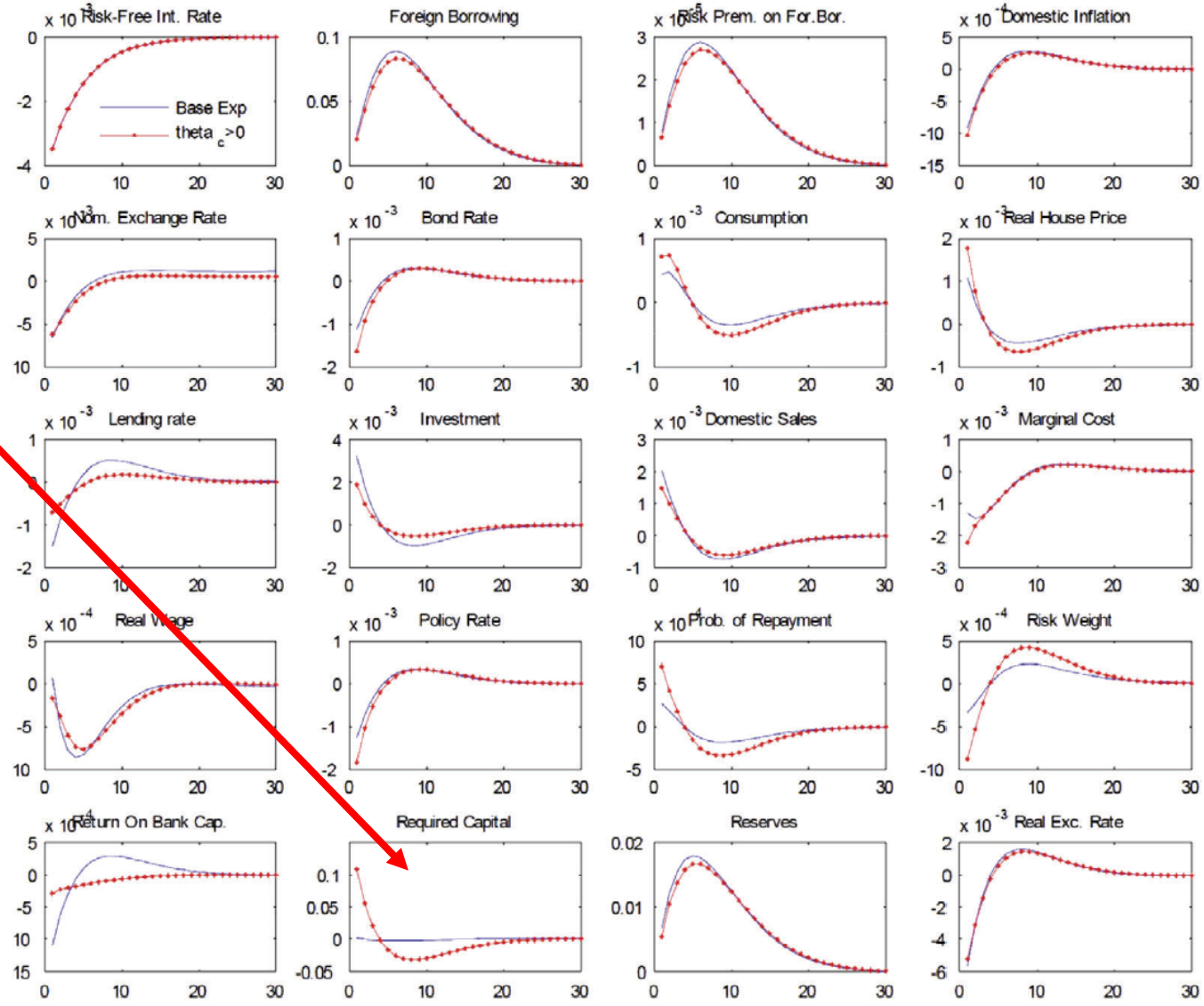


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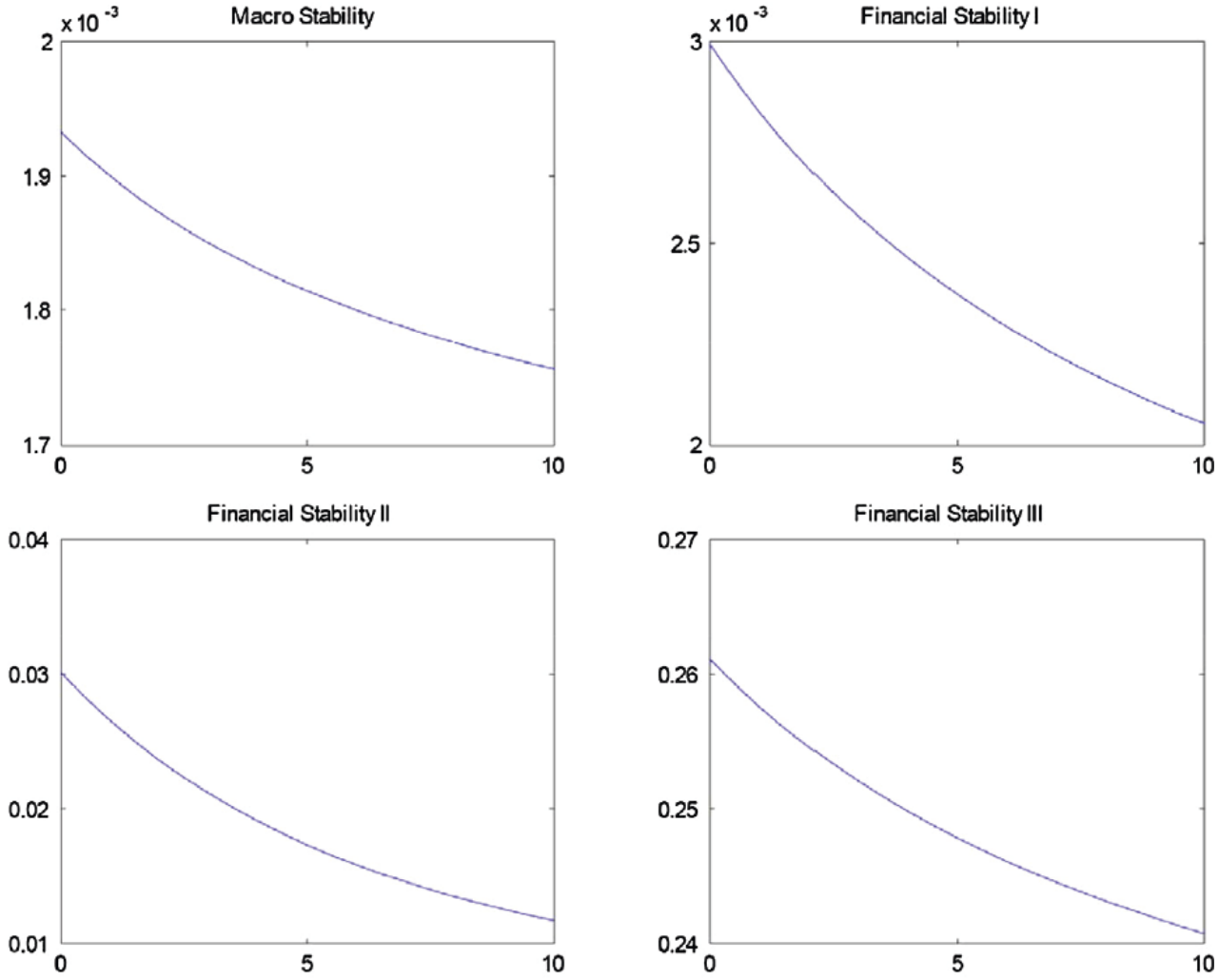
Fig. 6. Positive Response in Countercyclical Regulatory Capital Rule. (Deviations from Steady State)

- Evaluation of policy mix: define a composite index of economic stability, calculated with two sets of weights: first with equal weight 0.5 to each objective of stability, and second with a weight of 0.7 for macroeconomic stability and 0.3 for financial stability
- To the extent that monetary policy has limited room for manoeuvre (given the nature of the shock that the economy faces), a countercyclical regulatory rule is a complementary instrument because it helps to improve outcomes relative to both macroeconomic and financial stability objectives. However, because the policy entails diminishing marginal returns

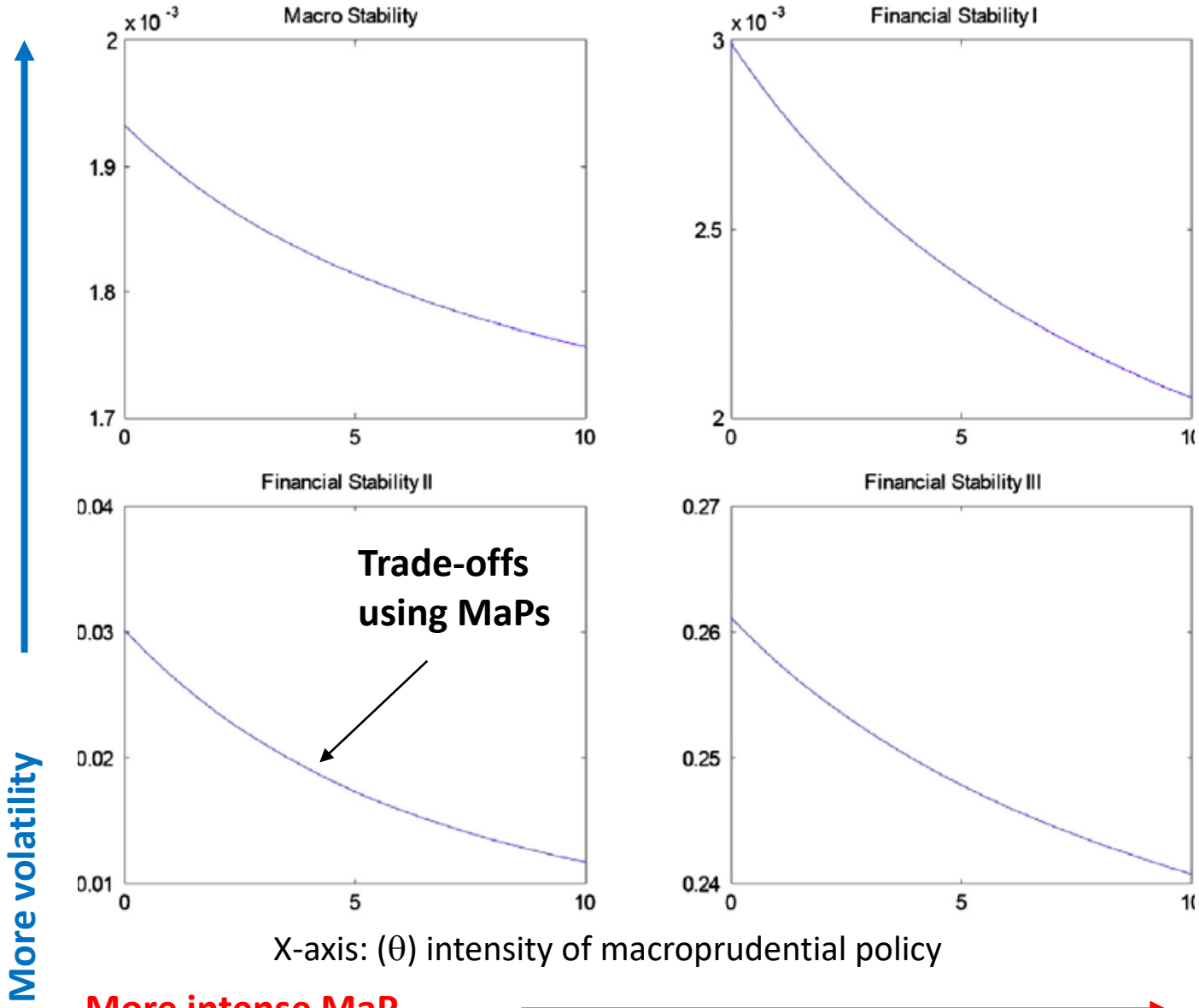


Note: The horizontal axis shows values of θ^C, and the vertical axis the coefficient of variation of the relevant variable. Macroeconomic stability is measured in terms of a weighted average of output volatility and inflation volatility, with weights of 0.3 and 0.7, respectively. Financial Stability I is defined in terms of real house price volatility and nominal exchange rate volatility, with equal weights. Financial Stability II is defined in terms of volatility of the ratio of total credit to GDP, and Financial Stability III is defined in terms of the volatility of the ratio of bank foreign borrowing (measured in domestic currency) to GDP.

Fig. 7. Countercyclical Regulatory Capital Rule: Impact on Macroeconomic Stability and Financial Stability.

DSGE finds optimal combination of MP's rate + MaP CCyCB rule

Y-axis: different indicators of economic stability combining different weights for <u>macroeconomic</u> (output and inflation volatility) and <u>financial stability</u> (housing price volatility and exchange rate volatility)



Source: Agénor et al. (2014), JIMF 48 (2014)

S 8.2.2. Integrated monetary and macroprudential policy rules

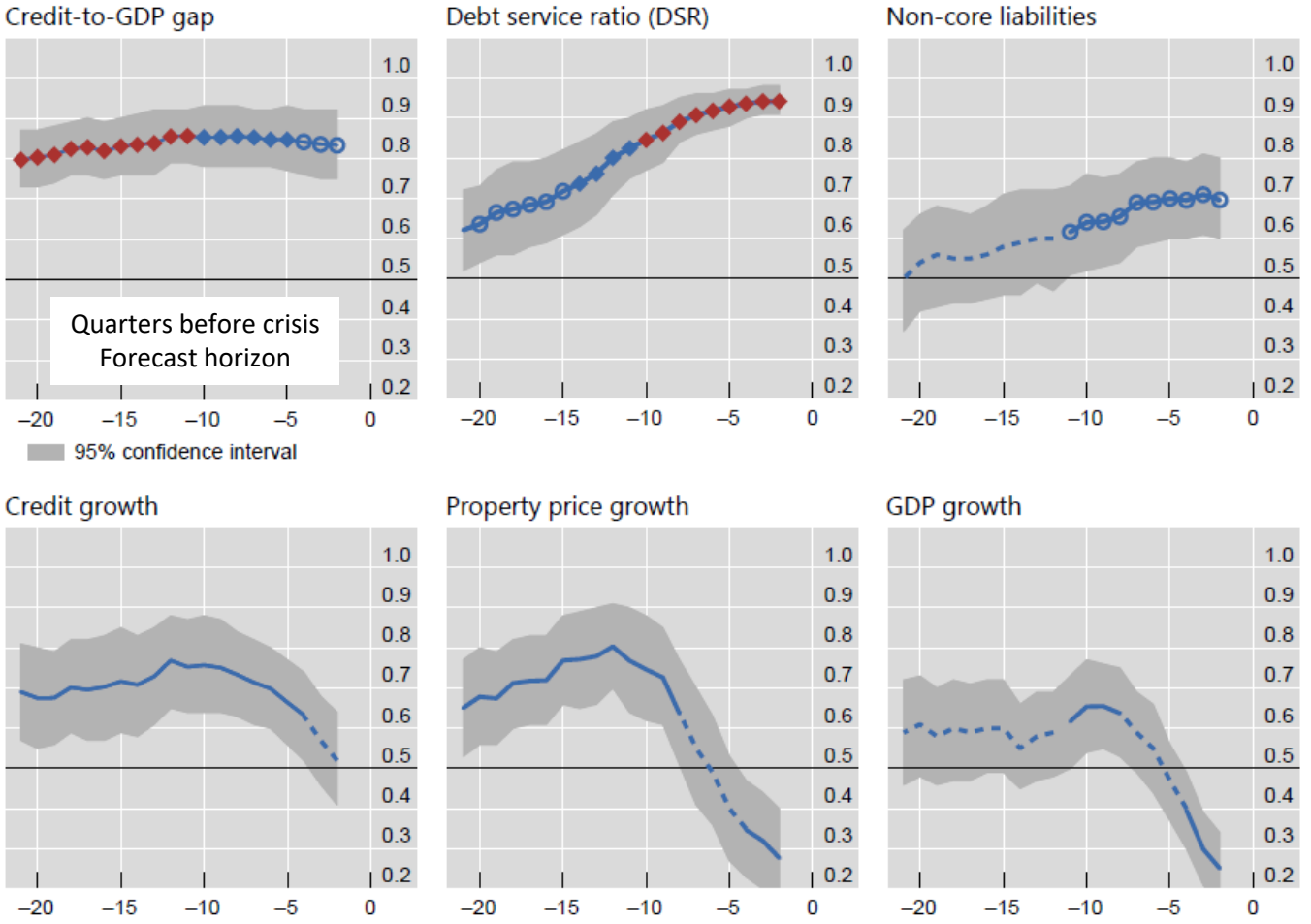
- To what should CB react under IIT (in addition to inflation)? In practice, combine MP reaction with some form of aggregate, easy to observe, that is related to build-up of financial “excess” and thus related to “credit” especially in bank-dependent EMEs
- Perhaps too blunt: Credit-to-GDP is calculated as the outstanding amount of debt at the end of the quarter compared with the sum of the last four quarters of nominal GDP; but by definition in EMEs this has to grow
- A more adequate early warning is credit-to-GDP gap: defined as the difference between the credit-to-GDP ratio and its long-run trend. It captures the build-up of excessive credit in a reduced form fashion. The gap indicator was adopted as a common reference point under Basel III to guide the build-up of countercyclical capital buffers.

Is the credit-to-GDP gap a good early warning indicator of financial crises for EMEs?

- The AUC (the area under the receiver operating characteristics curve, or ROC curve) is a statistical tool used in assessing the performance of signals that forecast binary events (ie events that either occur or do not). The term ROC reflects the origins of the tool in the analysis of radar signals during World War II, although it has a long tradition in other sciences. Its applications to economics are more recent. The AUC summarises the trade-off between correct and false signals for all different operator (policymaker) preferences.
- The uninformative indicator has an AUC equal to 0.5 (area under the 45° line), while that for the fully informative indicator is equal to 1. The intermediate cases have values in between.

The signalling quality of different EWIs

AUCs for different forecast horizons — Graph 2



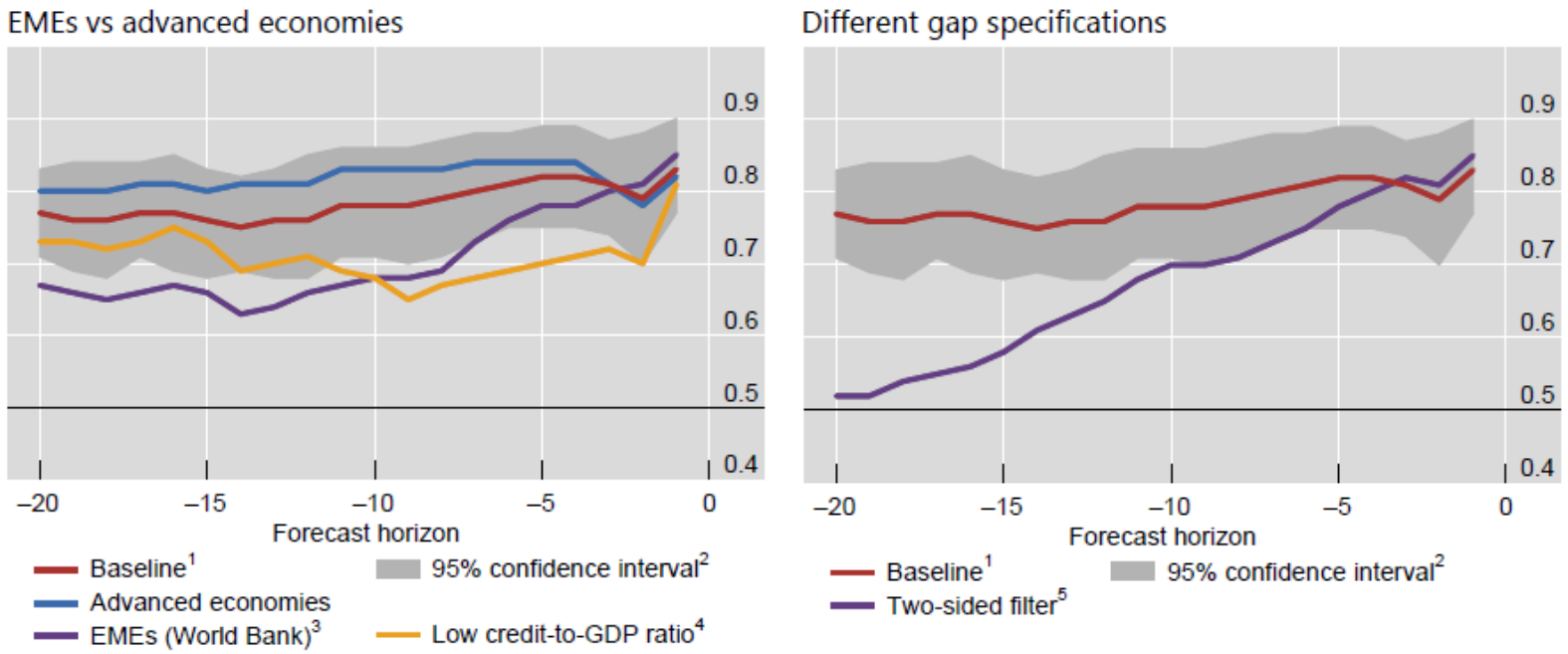
The horizontal axis denotes the forecast horizons in quarters before crises. The vertical axis denotes the AUC. The horizontal line at 0.5 highlights the value of an uninformative indicator. A solid blue line indicates that the specific variable for the given horizon is statistically different from an uninformative indicator, while a dashed blue line indicates the opposite. A hollow blue circle shows that the signal is stable in the sense that it does not reverse direction within the forecast horizon until the crisis. A red diamond highlights that the specific variable is statistically the best indicator for this particular horizon. Other indicators that are not statistically different from the best-performing indicator are marked by solid blue diamonds.

Source: Drehmann and Juselius (2014).

Is the credit-to-GDP gap a good early warning indicator of financial crises for EMEs?

The forecast performance of the credit-to-GDP gap

AUCs for different forecast horizons — Graph 3



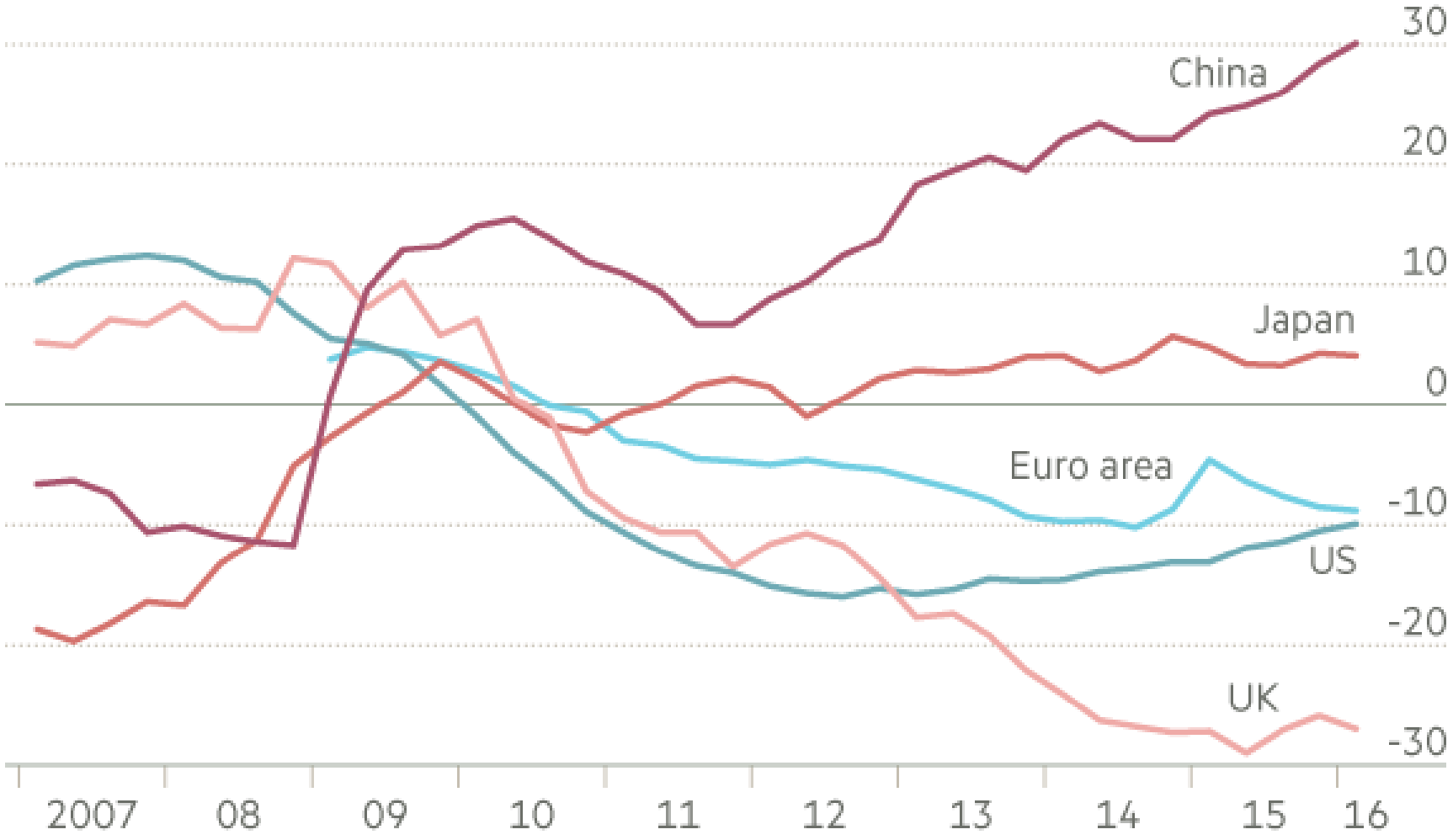
The horizontal axis denotes the forecast horizons in quarters before crises. The vertical axis denotes the AUC. The horizontal line at 0.5 highlights the value of an uninformative indicator.

[1] As baseline, credit-to-GDP gaps are calculated by the standard methodology and the full sample of all countries is used. [2] 95% confidence interval for the AUC using the baseline model. [3] EMEs according to World Bank classification. [4] Countries with a credit-to-GDP ratio below 100%. [5] The credit-to-GDP gap is derived by using the standard two-sided Hodrick-Prescott filter with the smoothing parameter lambda of 400000.

Source: Authors' calculations.

China ‘credit gap’ rises

Difference between current credit-to-GDP ratio* and long-term trend (%)



* Excluding government debt

Source: Bank for International Settlements

FT

S 8.2.3. Implementing integrated policy rules

- Still additional questions apply to get the best indicator(s) for IIT
- What type of credit should be in the credit gap? For ex, working capital in EMEs is important for the real economy
- What “reference” growth rate? Difference vis-à-vis a “statistical trend” (using filters) or vis-à-vis some “equilibrium” credit gap, taking into account real economy structural changes, growth, demographics
- Destination of credit (eg., consumption or investment) also important
- Credibility issues for CB with a modified reaction function; can de-anchor expectations; market inflation projections with new reaction function should convergence to those of CB; model transparency

S 8.2.4. Other institutional arrangements under IIT – domestic coordination (1/2)

- Adding a financial stability mandate to CB requires reflecting on institutional arrangements; in many cases CBs have set-up a specific Financial Stability Committee (or structure in charge, with Board):
  - Micro and macroprudential authority
  - Supervisory authority
  - Resolution authority
  - Otherwise, need to coordinate through specific Committees, role with other agencies in charge; might entail some transaction costs and potential delays
- Financial stability continuous objective; not point in time; more difficult to assess v-a-v “deviation” from inflation target

S 8.2.4. Other institutional arrangements under IIT – domestic coordination (2/2)

- Design and transparency of IIT reports (now joining both price and financial stability or under two separate issues)
- Fiscal discipline, fiscal rules and stabilization funds
  - Under flex-IT or IIT, fiscal-monetary interactions matter
  - Inconsistent fiscal policy will undermine IT or IIT
  - Some fiscal rule and/or with a fiscal stabilization fund can help

S 8.2.5. International coordination

- GFC has showed that differences in regulatory regimes can trigger arbitrage and magnify capital flows
- “Sudden stops and floods” have destabilizing effects; but also implementing MAPs can affect flows;
- “Basel principle of reciprocity” for counter-cyclical capital buffers (CCyB); home country is required to maintain at least the same CCyB as the host country for its banks in that jurisdiction; one step
- More coordinated MAP/MP action more elusive (G20, BIS meetings, etc); but with current challenges, unavoidable question for stability

S 8.3. Example of IIT at work during the GFC sudden flood episode – Brazil post-GFC 2010

- House (relatively) in order.. Local banks not affected by GFC, well-capitalized, regulated, supervised.
- UMP brings significant K inflows.. First line of defense, FX interventions to let (floating ERR) currency appreciate with significant reserve accumulation.
- Political economy of financial exuberance sets in; foreign borrowing in FX; specific segment of credit market bubbles (car loans not housing “subprime” loans); maturities of used car loans up to 7 years; LTV well above 100%.
- Yield differential high with Treasuries attracting ST K inflows; inflation pass-through not too significant.

What does the policy-maker do?

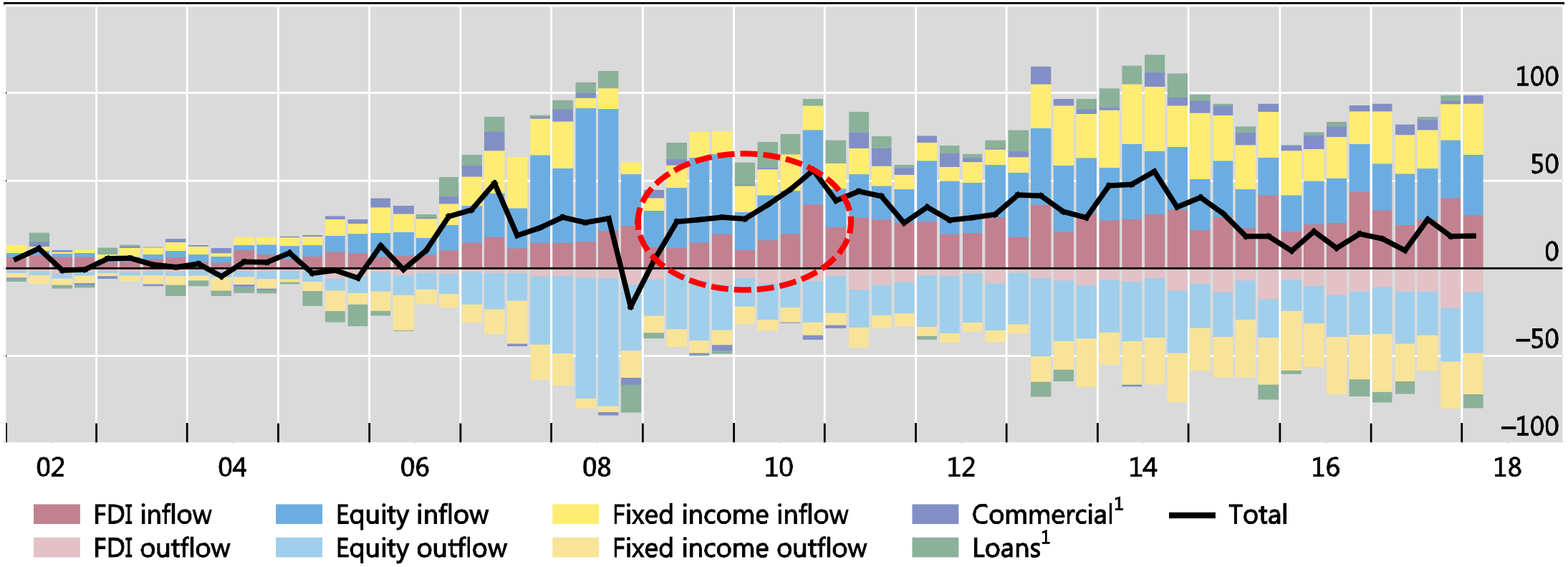
- Hike the policy rate and increase yield differential, more K inflows? Use MaPs to reduce the specific sector exuberance?

Ex: Brazil with “sudden floods” post-GFC

Gross capital flows: Brazil, 2002–18

In billions of US dollars

Figure 1.4a



[1] Net flows.

Sources: Central Bank of Brazil; authors’ calculations.

Policy Mix

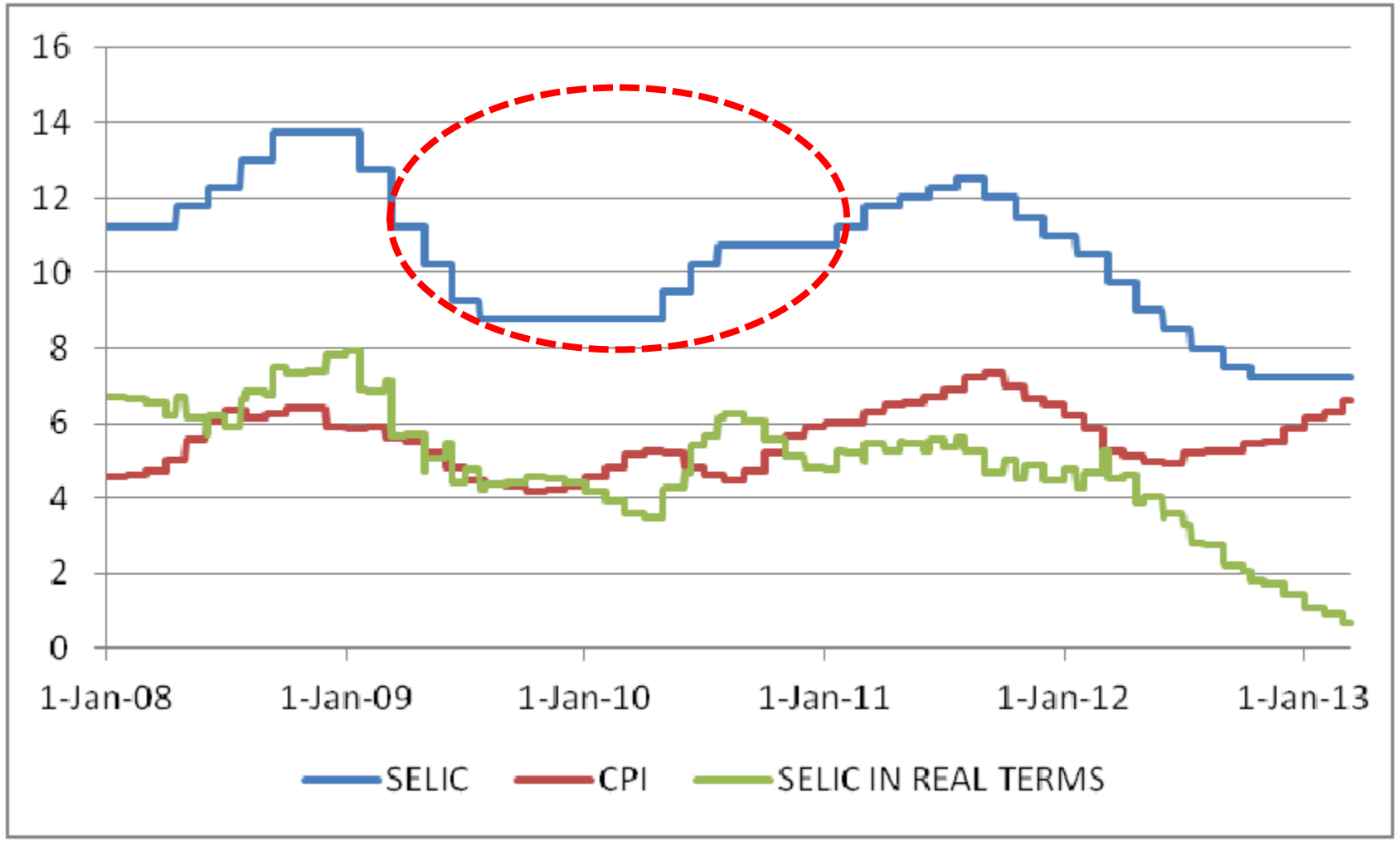
- MP : moderate 2009-mid 2010 then tighter 2011 MP
- Tighter Fiscal Policy 2010-2011
- Tax on capital inflows (non-resident fixed-income and derivatives)
- Tax on short-term external bank credit and FX open positions
- Tighter Reserve Requirements (RR)
- Higher tax on financial transactions (IOF) for domestic credit
- Specific measures (risk-weights) on consumer and car loans

Table 3: Macroprudential, monetary and fiscal policy measures

Policy Measures:	Unit	2009				2010				2011			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
On Activity													
Selic Base rate (average)	%	12.6	10.3	8.9	8.8	8.8	9.5	10.6	10.8	11.3	12.0	12.3	11.4
Selic Base rate increase	(+bps)	-250	-200	-50	0	0	150	50	0	100	50	-25	-100
Primary Fiscal Surplus													
Target	% GDP	-	-	-	2.50	-	-	-	3.10	-	-	-	3.09
Achievement	% GDP	-	-	-	2.00	-	-	-	2.70	-	-	-	3.11
Public Debt (Net)	% GDP	39.1	41.2	42.8	42.1	41.1	40.0	39.4	39.2	38.9	38.6	36.3	36.4
On Capital Flows													
Tax on Financial Transactions (IOF)													
Nonresident Fixed Income	%	0	0	0	2	2	2	2	6	6	6	6	6
Derivative margin deposits	%	0.38	0.38	0.38	0.38	0.38	0.38	0.38	6	6	6	6	6
Equity	%	0	0	0	2	2	2	2	2	2	2	2	0
Reserve Requirement on Short FX Open Positions in Spot Market	%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Minimum between 60% of what exceeds US$ 3 billion or Tier 1 capital	Minimum between 60% of what exceeds US$ 1 billion or Tier 1 capital	Minimum between 60% of what exceeds US$ 1 billion or Tier 1 capital	Minimum between 60% of what exceeds US$ 1 billion or Tier 1 capital
External Credit Inflows	%	5.38	5.38	5.38	5.38	5.38	5.38	5.38	5.38	6	6	6	6
taxable maturity	days	90	90	90	90	90	90	90	90	360	720	720	720
FX Derivatives	%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	1
On Credit													
Reserve Requirements (RR)													
Outstanding RR	R$ b	174.9	179.4	186.0	193.6	233.2	279.5	301.3	395.2	400.9	418.6	434.7	448.5
Outstanding RR	% credit	14.0	13.9	13.7	13.6	15.9	18.1	18.5	23.0	22.7	22.7	22.4	22.0
Average ratio on Demand Deposit	%	42.0	42.0	42.0	42.0	42.0	42.0	42.9	43.0	43.0	43.0	43.0	43.0
Average ratio on Term Deposits	%	15.0	15.0	14.5	13.5	13.5	14.9	15.0	15.8	20.0	20.0	20.0	20.0
Tax on Financial Transactions (IOF) on domestic credit	%	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0082	0.0082	0.0068

Source: Central Bank of Brazil and authors´ calculations

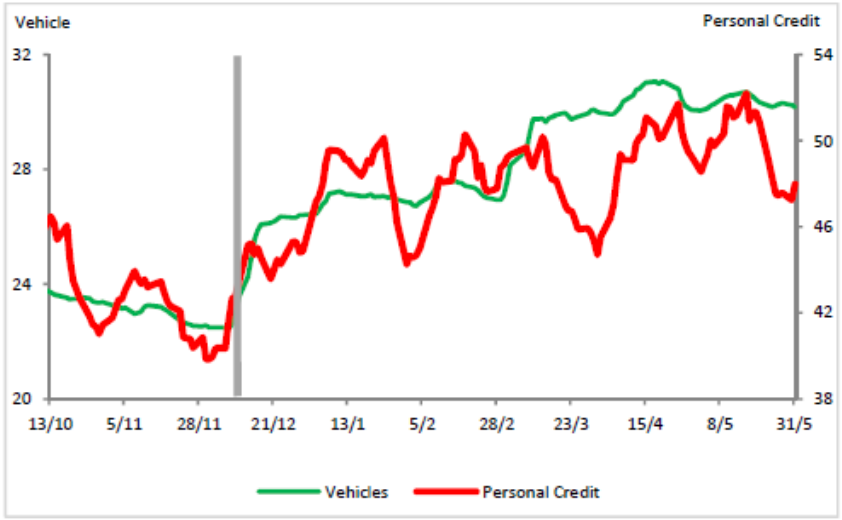
Ex: Brazil with “sudden floods” post-GFC kept moderately tighter policy rate (Selic) for a while



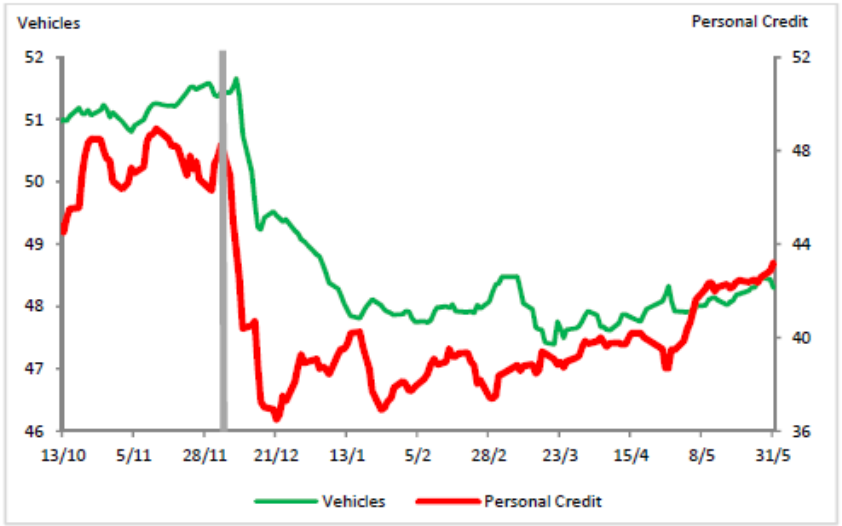
But tighten MAPs

- Overheating in specific niches of credit market (consumer and car loans): extended maturities up to sometimes 7 years and large >100% loan-to-value (LTV) loans
- Measures affected capital requirements (risk-weights) for such loans (end-year 2010); they reverted somehow the “bubble”; interest rates went up and average maturity of these loans went down

Graph 4 – Interest rate – 5 days moving average (% p.a.)
Vehicles financing and personal credit



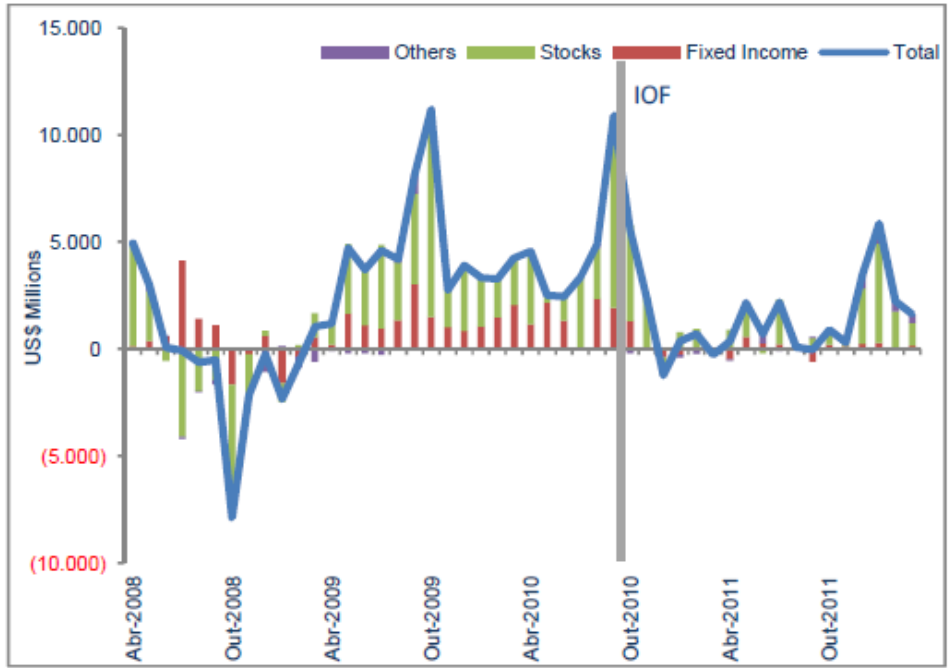
Graph 5 – Average maturity – 5 days moving average (months)
Vehicles financing and personal credit



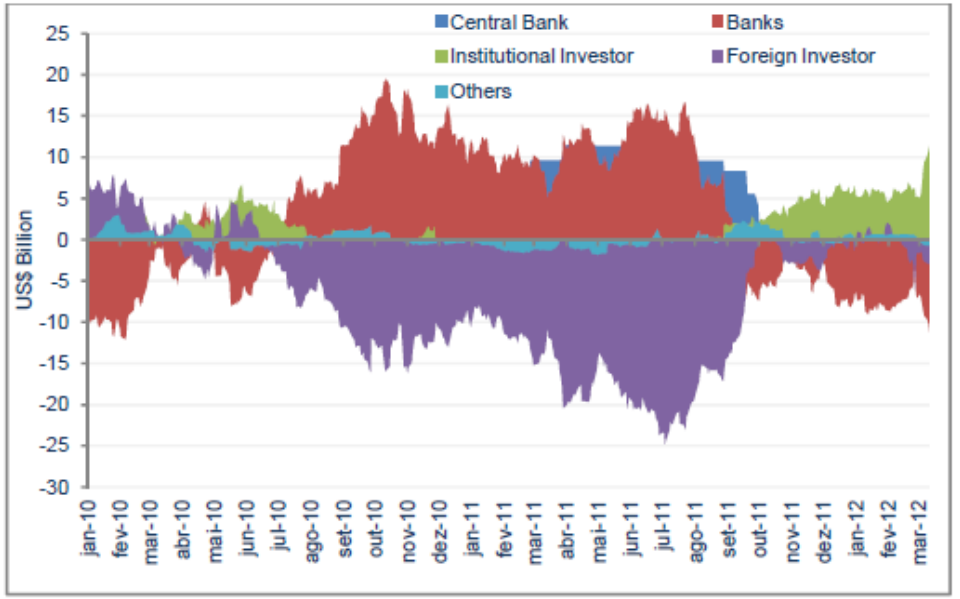
But tighten FXI, CFM

- Taxes on capital inflow (ST) managed to reduce portfolio inflows end of 2010
- Taxes on derivative exposures by banks also managed to reduce these positions
- NB. Banks betting on “continuous” appreciation of the BRL due to “sudden flood” of ST capital inflows (potential risk for financial stability)

Graph 6 - Portfolio’s Net Inflows by Asset Class – monthly data



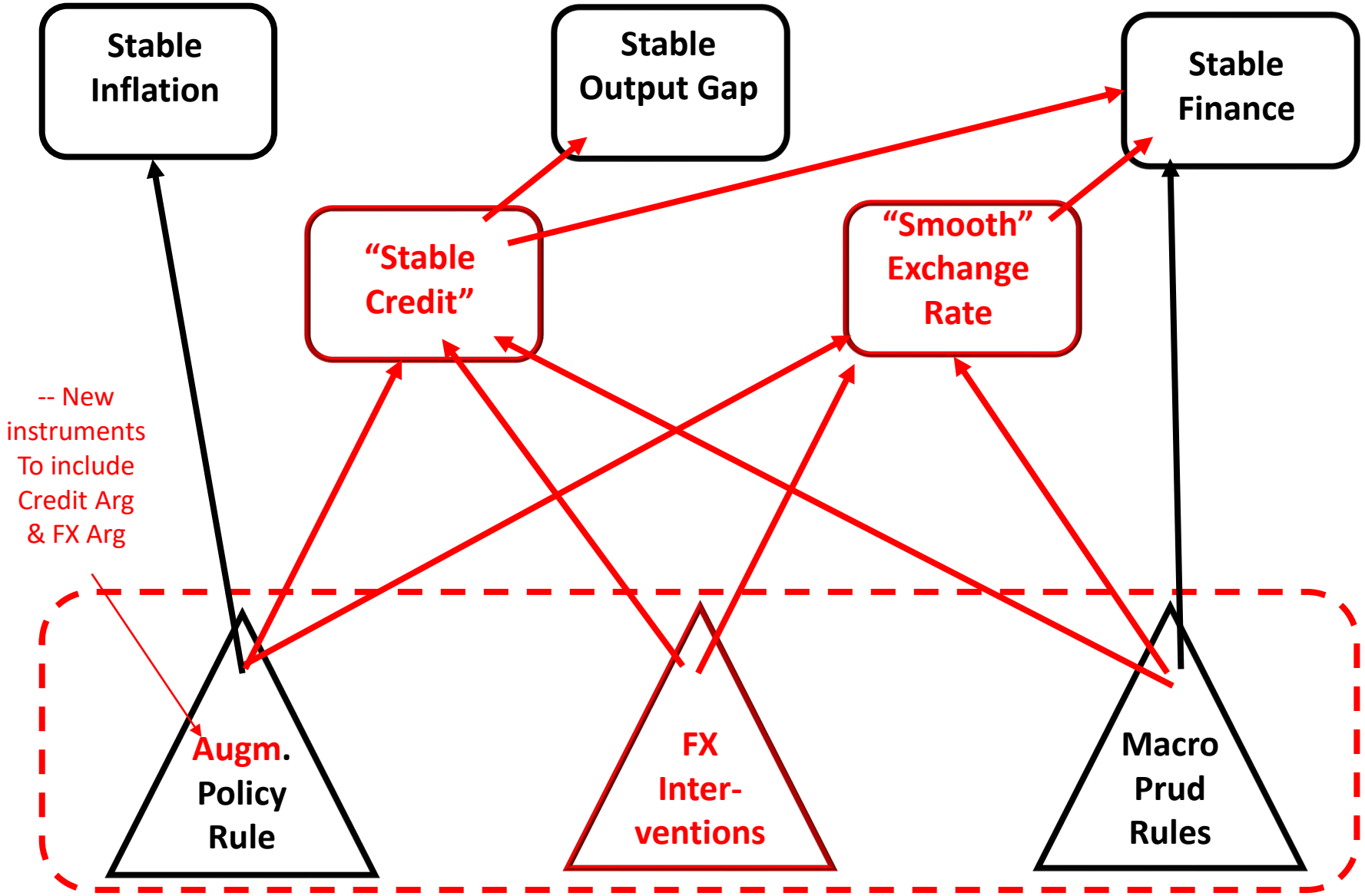
Graph 8 – FX Derivatives Exposure – by type of investor



S 8.4. Policy lessons for Integrated Inflation Targeting (IIT) (1/2)

- To achieve macroeconomic (activity, price and financial) stability, monetary and macroprudential policies are complementary (and fiscal policy needs to help too)
- In EMEs, good case to advocate for IIT; MP pro-active, address financial systemic risk in complement with counter-cyclical MAPs
- Episodes of high credit growth, combine higher capital requirements, other CCyB with MP help to reduce build-up of financial risks
- MP can follow rule-based on credit gaps under IIT with “intermediary objectives”, “adequate credit growth” and “smoother ER”

Integrated framework (FX + MaPs + MP) to address their policy spillovers: progress or confusion?



S 8.4. Policy lessons for Integrated Inflation Targeting (IIT) (2/2)

- CB should account in a state-contingent fashion, for credit developments when setting MP, calibrated jointly with MAPs
- CB should have an explicit financial stability mandate
- CB should use counter-cyclical MAPs as complement to MP, controlling for nature of shocks
- CB should maintain flex ER regime but be ready to combine FXI and ER-specific MAPs to smooth volatility
- To achieve macro stability, MP should be supported by fiscal discipline; a fiscal stabilization fund can help, especially commodity exporters

Main differences between flex-IT and IIT

Flexible IT and IIT regimes

Table 2

		Flexible IT	**Integrated IT**
Objectives: macroeconomic stability	*Price stability*	Inflation target (point/centre of band) using Taylor rule for short-term interest rate	Inflation target (point/centre of band) using state-contingent, augmented Taylor rule for jointly calibrated short-term rate with macroprudential and with financial/credit argument
	Output stability		
	Financial stability	Microprudential	
		Floating exchange rate	Macroprudential instruments + floating exchange rate with FX interventions, not peg/fix, but smooth volatility and impact on balance sheets
Institutional arrangement	*Price stability*	Monetary Policy Committee	Monetary Policy Committee
	Financial stability	Prudential Authority	Financial Stability Committee
	Location	Two independent agencies	Mostly within same agency (central bank)
	Operational modus	Separation	Coordination

Source: Agénor and Pereira da Silva (2019)

S 8 References

- Agénor P.R. and L. A. Pereira da Silva “Integrated inflation targeting”, BIS, 2019.
- Borio, Claudio, and Haibin Zhu, “Capital Regulation, Risk-Taking and Monetary Policy: A Missing Link in the Transmission Mechanism?,” Journal of Financial Stability, 8 (December 2012), 236-51.
- Brunnermeier, Markus K., and Yuliy Sannikov, "International Credit Flows and Pecuniary Externalities," American Economic Journal: Macroeconomics, 7 (January 2015), 297-338.
- Bruno, Valentina, and Hyun Song Shin, “Capital Flows and the Risk-Taking Channel of Monetary Policy,” Journal of Monetary Economics, 71 (April 2015), 119-32.
- Cecchetti, Stephen G., and Marion Kohler, “When Capital Adequacy and Interest Rate Policy are Substitutes (and when they are not),” Working Paper No. 379, Bank for International Settlements (May 2012).
- Cerutti, Eugenio, Stijn Claessens, and Luc Laeven, “The Use and Effectiveness of Macroprudential Policies: New Evidence,” Journal of Financial Stability, 28 (February 2017a), 203-24.
- Cerutti, Eugenio, Stijn Claessens, and Andrew K. Rose, “How Important is the Global Financial Cycle? Evidence from Capital Flows,” Working Paper No. 661, Bank for International Settlements (August 2017b).
- Chang, Roberto, and Andrés Velasco, “Liquidity Crises in Emerging Markets: Theory and Policy,” in NBER Macroeconomics Annual 1999, edited by Ben Bernanke and Julio Rotemberg, MIT Press (Cambridge, Mass.: 2000).
- Chamon, Marcos, and Márcio Garcia, “Capital Controls in Brazil: Effective?,” Journal of International Money and Finance, 61 (March 2016), 163-87.
- Chamon, Marcos, Márcio Garcia, and Laura Souza, “FX Interventions in Brazil: A Synthetic Control Approach,” Journal of International Economics, 108 (-2017), 157-68.

S 8 References

- Chamon, Marcos, and Márcio Garcia, “Capital Controls in Brazil: Effective?,” Journal of International Money and Finance, 61 (March 2016), 163-87.
- Committee on the Global Financial System, “Capital Flows and Emerging Market Economies,” CGFS Working Paper No. 33, Bank for International Settlements (January 2009).
- ——, “Macroprudential Instruments and Frameworks: A Stocktaking of Issues and Experiences,” CGFS Paper No. 38, Bank for International Settlements (May 2010).
- Domanski, Dietrich, Emanuel Kohlscheen, and Ramon Moreno, “Foreign Exchange Market Intervention in EMEs: What has Changed?,” Quarterly Review, Bank for International Settlements (September 2016), 65-79.
- Dooley, Michael, “A Survey of Literature on Controls over International Capital Transactions,” IMF Staff Papers, 43 (December 1996), 639-87.
- Financial Stability Board, “Macroprudential Policy Tools and Frameworks: Update for G20 Finance Ministers and Central Bank Governors,” unpublished (February 2011).
- Forbes, Kristin, Marcel Fratzscher, Thomas Kostka, and Roland Straub, “Bubble thy Neighbour: Portfolio Effects and Externalities from Capital Controls,” Journal of International Economics, 99 (March 2016), 85-104.
- Forbes, Kristin, Marcel Fratzscher, and Roland Straub, “Capital-Flow Management Measures: What are they Good for?,” Journal of International Economics, 96 (July 2015), s76-s97.
- Forbes, Kristin, Dennis Reinhardt, and Tomasz Wieladek, “The Spillovers, Interactions, and (Un)Intended Consequences of Monetary and Regulatory Policies,” Journal of Monetary Economics, 85 (January 2017), 1-22.

S 8 References

- Gourinchas, P-O and M Obstfeld (2012): “Stories of the twentieth century for the twenty-first”, American Economic Journal: Macroeconomics, vol 4, March, pp 226-65.
- Financial Stability Board, International Monetary Fund and Bank for International Settlements (2016): “Elements of Effective Macroprudential Policies: Lessons from International Experience”, report to the G20, August.
- Mishkin, F (2000): "Inflation Targeting in Emerging-Market Countries", American Economic Review, 90, pp. 105-109.
- Obstfeld, M (2015): “Trilemmas and Trade-offs: Living with Financial Globalisation,” in Global Liquidity, Spillovers to Emerging Markets and Policy Responses, ed. by Claudio Raddatz, Diego Saravia, and Jaume Ventura. Santiago: Central Bank of Chile.
- Obstfeld, M, J Ostry, and M Qureshi (2017): “A Tie That Binds: Revisiting the Trilemma in Emerging Market Economies,” Working Paper No. 17/130, International Monetary Fund.
- Ostry, Jonathan D., Atish R. Ghosh, Marcos Chamon, and Mahvash S. Qureshi, “Tools for Managing Financial-Stability Risks from Capital Inflows,” Journal of International Economics, 88 (November 2012), 407-21.
- Rajan, Raghuram G., “Has Financial Development Made the World Riskier?,” in The Greenspan Era: Lessons for the Future, Federal Reserve Bank of Kansas (Kansas City: 2005).
- Reinhart, Carmen M., and Kenneth S. Rogoff, “Banking Crises: An Equal Opportunity Menace,” Working Paper No. 14587, NBER (December 2008).
- Rey, Hélène, “Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence,” Working Paper No. 21162, National Bureau of Economic Research (May 2015).
- Schoenmaker, Dirk, “The Financial Trilemma,” Economics Letters, 111 (April 2011), 57-59.
- Schularick, Moritz, and Alan M. Taylor, “Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870-2008,” American Economic Review, 102 (June 2012), 1029-61.
- Sims, Christopher, A., “Limits to Inflation Targeting,” in The Inflation-Targeting Debate, ed. by Ben S. Bernanke and Michael Woodford, University of Chicago Press (Chicago, Ill.: 2005).
- Stein, J (2012): "Monetary Policy as Financial-Stability Regulation", Quarterly Journal of Economics, Vol 127, pp 57-95.